JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES—GAS, &c.

Irish International Exhibition.

READERS have recently been put into possession of the technical features of the programme arranged for the June meeting of the Institution of Gas Engineers in Dublin; and what is for brevity called the social part of the arrangements will be fully announced in due course. In the making of these arrangements, the Irish International Exhibition will take a prominent place; for the Exhibition—together with the proposal that it should incorporate a Gas Section—was the *raison d'être* for the choice of the capital city of Ireland being the scene of the meeting this year of the Institution. In this week's issue is a description of the exhibits in the Gas Section; and if quantity in respect of the number of exhibitors is not a feature, in quality, in respect of the means of utilizing gas, we think it will be agreed that there will be meritorious exemplification. This remark is no disparagement to the absentees; it is merely another way of saying that the firms exhibiting, and the goods they will expose to public and professional gaze, will be fully representative. It would have been disappointing, we are sure, to the whole gas industry had it not been so. No great international exhibition in which the arts and commerce are generally represented would be complete if an industry wielding such influence and benefit in life as that of the gas industry had no material part in it; and those firms producing gas plant and appliances who are exhibiting, and the goods they will display and the demonstrations they will make, will stand for much in the Dublin Exhibition. We agree that commercial firms cannot be expected to fill the rôle of philanthropists in business; we submit in the same breath that those who on such an occasion as this Exhibition give, at considerable inconvenience and expense, representation to a great industry deserve gratitude at the hands of that industry. The difficulties standing in the way of the organizing of the section have been many and great. They need not be detailed here, inasmuch as they are of common knowledge. But the personal exertions of Mr. Francis T. Cotton, the Secretary of the Alliance and Dublin Consumers' Gas Company, in endeavouring to subvert obstacles cannot pass without honourable mention.

Of course, it was not anticipated that many makers of heavy gas plant would see their way to exhibit; but there is this to be said, that those who are showing in any way—by actual plant, by model, or by photograph—will, through their singleness, have more individual attention bestowed upon them by professional visitors, especially in June, than would have been the case if their number had been greater. Lighting will be a distinctive feature for gas. At the main entrance, in the grounds, in halls, in the Gas Section, high-power gas lighting—in which increased gas pressure has part, or in which lamps that are self-intensifying produce the enhanced efficiency over ordinary forms of burner and lamp—is given by the exhibitors the richest demonstration. Ordinary gas lighting, too—both by vertical burners and by the increasingly favoured and economical inverted burner—is receiving plentiful illustration. The public will also be initiated into the mysteries of the making of incandescent mantles. The latest in gas cookers and fires, with the several latter-day improvements that have made for economy and efficiency, will be shown. And assurance will be given to the public, by the testing appliances, and by the excellent examples of meters that will be exhibited, that everything possible is done to ensure that they receive, both in quality and quantity of gas, that for which they bargain to pay under the conditions prescribed by Parliament. Of this we are confident, that there will not be disappointment with the effect of the display that is now being made at the Irish International Exhibition on behalf of the gas industry; and this verdict, we believe, will be confirmed by the competent judges who will be making their inspection next month.

South Metropolitan Rating Appeal—An Incitement to Increase Assessments.

THE long and expensive inquiry at the County of London Quarter Sessions, before the new Chairman, Mr. Robert Wallace, K.C., into the appeal of the South Metropolitan Gas Company against the assessment of their undertaking by certain Unions, has terminated in what must be regarded as a most unsatisfactory manner. That the Company have not succeeded in their appeal is, in itself, sufficiently unsatisfactory; but it is rendered even more so first by the fact that on those very points which it was hoped and anticipated this case would have produced elucidation, and upon which there would have been judicial pronouncement, we are still left in darkness and dubieity, and secondly by certain remarks of the Chairman of the Bench, in giving judgment, which, with all respect, we think exceeded the bounds of the case before him, and will assuredly serve to incite the Unions to action which must almost inevitably result, at some future time, in further heavy litigation.

After the interjections of the Chairman early in the case and as it proceeded, the decision adverse to the Company did not come altogether as a surprise. From the very outset, Mr. Wallace made it abundantly clear that he did not intend to be bound in any way by the previous practice of the Court in the matter of the percentage allowance for the tenant's share—for profit, for interest on the money the tenant has to find, and for risks. During the hearing, it became increasingly evident that the Chairman looked upon the time-honoured 17½ per cent. as completely indefensible, and there was no room for doubt about it when he came to his judgment. "I decline," he said, "and so do my "colleagues, to recogn ze any percentage as fixed, either "by this Court or by any other. The percentage has to "be taken into consideration in regard to every particular "case." Hitherto at the London Sessions, it has been the practice to allow 17½ per cent. on the tenant's capital as the tenant's share; and this has been followed generally throughout the country. The percentage has, in fact, almost attained prescriptive status; and the modern conditions of gas supply certainly do not warrant any declension. Though there may legitimately be differences of opinion as to whether 17½ per cent. is or is not the proper allowance, it is of great practical advantage for a definite percentage to be adhered to in all normal cases, in order to prevent useless litigation; and it is therefore much to be regretted that the Chairman did not give some indication as to the percentage which he considered would be a fair one to allow. That he and his colleagues had fixed upon a percentage in their minds was admitted; but what that percentage was continued fixed, so far as open Court was concerned, where it had been formed. The only interesting point on this head that can be extracted from the judgment is that the figure in the minds of the Chairman and the Bench was such "that the "amount fixed by the Assessment Committee was an under-"estimate rather than otherwise." But the conclusion cannot be avoided, having regard to all the circumstances, that the decision was evolved from general considerations rather than from any strict attention to the figures. In his judgment (which was delivered immediately after Mr. Balfour Browne, for the appellants, had concluded his reply on the case of the respondents) Mr. Wallace said: "In our opinion, "it becomes unnecessary even to go into the figures with "any closeness at all." This could not have applied to the judgment, as no figures on the points at issue were given in it; and therefore the assumption is the remark must have applied to the consideration of the case generally. In short, the judgment merely amounted to a declaration that, having regard to the general circumstances of the case, it was considered that a tenant would be willing to give such a rent as would uphold the assessment.

In addition to the question of the tenant's share, the only point in regard to the figures that was made against the

appellant's case was that the profits during the account year were, owing to the price of gas, lower than in any other year; and Sir George Livesey himself said he thought it would be fairer to take an average of five years. Apart from this, it is not too much to say that, where any differences occurred between the appellants and the respondents in respect of the figures, the appellants' case was fully made out; and although the respondents showed a very large surplus of rateable value over and above that needed to support the assessment, it was accomplished by a series of adjustments, which were each in turn shown to be unjustifiable. But, in spite of this, it seems that the fact of the respondents being able to make out a valuation which, *primâ facie*, presented a large margin had some effect on the Chairman's mind; and the terms in which judgment was delivered by him seem to uphold this view.

An important part of the case had reference to the disputed point as to whether prepayment meters, stoves, and fittings should be regarded as part of the tenant's capital, or as part of the rateable hereditament. In the case of *The Queen v. Lee*, meters were held to be part of the tenant's capital; and it is contended, on behalf of gas undertakings, that stoves and gas-fittings generally under the prepayment system cannot be distinguished from meters. The rating authorities, however, submit otherwise—that they ought not to be taken into account as tenant's capital. The matter will continue to be a thorny point until there is some authoritative pronouncement regarding it. That pronouncement has not been obtained in this South Metropolitan case. On the contrary, Mr. Wallace gave encouragement to the assessment authorities to persevere in their contention. Productive mains he regarded as having in this instance been absolutely under-assessed; and this conclusion he came to by assuming that prepayment meters, stoves, fittings, and all the accessories, were included in the tenant's capital. But the proposition that they should be so included is one which, "if he had to discuss it in regard to every point, he "should respectfully dissent to." In other words, by determining that the productive mains were under-assessed, assuming that the prepayment meters, stoves, &c., were included in the tenant's capital, the Chairman and the Bench relieved themselves of the responsibility of definitely stating their opinion on the point. But the indirect intimation is sufficient indication of what is their opinion, or, perhaps it would be better to say, of their Chairman. On the other hand, in the Ipswich Gas-Works assessment case, Mr. T. C. Blofield, after careful deliberation, found that prepayment meters, stoves, and fittings on consumers' premises were provided by, and were the property of, the hypothetical tenant, and should be taken into account as part of the tenant's capital, in accordance with the case of *The Queen v. Lee*. The matter is one which opens up a vista of keen controversy; and the assessment authorities seem disposed, whenever opportunity arises, to carry the matter further—to the House of Lords, if necessary—and to raise the whole question as to whether the case of *The Queen v. Lee* was rightly decided. It is undoubtedly an important question for both gas undertakings and assessment authorities; and the importance increases with the growth of the prepayment gas-meter business. Mr. Wallace's intimation as to his view only aggravates the unsettled problem.

It must also be regretted that what was tantamount to an invitation to the authorities to put up the rating should have fallen from the Chairman of the Bench. "I think "that," said Mr. Wallace, "not merely must this appeal "be dismissed, but that the figure fixed by the Assessment "Committee is—I was going to say—so far below what in "our view the evidence would warrant them in fixing it at, "that it is most unnecessary to go into the figures at all." The assessment authorities do not need any such stimulation; and we cannot help thinking that, in the cause of peace and amicable settlement in future, the observation is one of those things that had far better have been left unsaid. As we have already remarked, the terms in which the judgment was given do not indicate in any way how it was arrived at, with the consequence that the rating of the Gas Companies of London, and incidentally probably of many other properties, has been thrown into the melting-pot; for it is impossible to tell, even approximately, what will be considered a reasonable return for the tenant. Without this, there is bound to be the very widest divergence between the ideas of the Companies and the assessment authorities as to what is a fair and proper rateable value.

There are, as will have been seen, many points for regret about this case; and there is yet one other. Although three Counsel, eminent in rating matters, had been engaged for the Company, none of them was able to be present on Tuesday morning to cross-examine the respondents' witnesses. One witness was cross-examined on Monday, and the others not at all. It was indeed a deplorable circumstance, and one which could not be without its effect upon the Court.

The Welsh Meeting—Tar for Road Purposes.

THE members of the Wales and Monmouthshire District Institution of Gas Engineers and Managers met on the ground of their President (Mr. R. A. Browning, of Neath) last Wednesday; but, on this occasion, their programme technically was not conspicuous in feature. The discussion that took place on the paper presented by Mr. Walter Lister at the last meeting, on "A Dust Preventer for Public Roads," redeemed the meeting from profitless stagnation; for interesting though Mr. Mayne's paper was as a practical experience in "The Use of Air for Revivifying Oxide *in Situ*," the employment of air for the purpose is now such an accepted principle in purification practice that small variations in methods of operation have only the interest attaching to personal experience and works' conditions. From that point of view, the paper is acceptable; and one good purpose it should serve is in the direction of inducing others to come forward with practical experiences of like order.

The discussion on Mr. Lister's paper indicates that the question of the use of tar for road purposes has arrested attention in Wales. The Principality has not escaped the nuisances and ravages of modern locomotion; and there have been isolated, but obviously not enthusiastic, trials there of the cures that have been proposed, including chemical preparations and tar. It was rather surprising to learn from one speaker that he considers the chemical preparations that have been submitted for use are on the high road to success, and that tar is being left in the rear, when the accumulated experience of practical road surveyors throughout the country is that there is nothing like tar for the end that it is desired to achieve. That end was at one time singular; but it is now plural. Chemical preparations only attain the single end of dust suppression, by incurring the expense of frequent application; the use of tar achieves that end and others simultaneously, and does not call for renewal at short periods. Experience is cumulative; and much has been learnt since some wise man tentatively flew to tar, with mingled hopes and fears, for relief from a positive nuisance, which was at once dangerous and destructively expensive. The mitigation of the dust nuisance was the primary and the most pressing question. In testing the virtue of tar for this object, collateral advantages were discovered, which might to-day almost be regarded as primary reasons for using tar, and dust suppression as the secondary one. The disintegration of the road surface is obviated by the tenacity and binding quality of the tar when properly applied. Greater durability is thus produced, wear and tear is lessened, the scraping of the roadway and the carting of the gathered mud are abolished, and road watering, and the cost of the water, horse labour, and attendants, are saved. In other words, there are savings in maintenance, and current expenses are much reduced. There is a point that the reading of the discussion at the Welsh meeting suggests requires to be emphasized. Mr. J. H. Canning and Mr. D. M. Jenkins, the Borough Surveyor of Neath, in their practical remarks, urged the point. It is that if tar is to be successful, it must be properly applied at the outset. Makeshift methods of doing the work will not be satisfactory. The incurring of the necessary expense to enable the work to be effectively executed in the first instance will well repay road authorities in the end.

The past twelve months has given us much experience on this new service for tar; and what has been learnt has not been to the disadvantage of the gas industry. If the cure of the dust nuisance had been the only beneficial result of the use of tar, the expense of its application would have caused its competitors to be regarded with greater favour; but it has been otherwise.

A Tax on Thrift.

EVERY newspaper reader must be pretty well satiated with questions raised regarding the income-tax by the revision of its incidence at the hands of the Chancellor of the Exchequer. But there is one view of the matter, affecting

the differentiation of earned (by individual exertion) and unearned incomes (by investment), that has not yet been discussed so far as we have observed, and which strikes very close home in the gas industry. It would be wasted effort to argue here whether or not in times of peace the income-tax is unjust; we have to accept the hard fact that Mr. Asquith has advised us to persuade ourselves that the income-tax is now an integral and permanent part of the national fiscal system. This being so, there is thankfulness that he has seen his way to reduce, by some 25 per cent., the amount of the tax levied on earned incomes. But there is little encouragement held forth to capital and joint-stock company enterprise to look for any lower figure than 1s. being regarded as the normal. By thus maintaining the 1s. income-tax on the earnings of investments in joint-stock enterprise, the Chancellor of the Exchequer has won the approval of one section of the proletariat—the section of labour within which thrift is a stranger, within which no thought is ever taken for the morrow, and within which are found those who worship devotedly at the shrine of universal old-age pensions. And that section is not the one that ought to be encouraged. The section that should be encouraged is the one in which prudence and thrift produce savings to be invested, and the income realized left to accumulate, to provide for old age or ill-health.

It is, however, the prudent and thrifty ones—those who by self-effort seek to keep themselves from becoming a burden on a country which can very well do without an accession to its present responsibilities—who receive least encouragement by the line of demarcation drawn by the Chancellor of the Exchequer between earned and unearned incomes, for determining the imposition of the income-tax on the lower or the higher scale. In these latter days, in truth, events seem to conspire to make the conditions of thrift as unattractive as possible; and yet it is the thrifty who are the least troublesome both industrially and nationally, and who have required less than others the, in large part, pampering and unnecessary class legislation of recent times. In the gas industry, modern legislation has incorporated provision whereby the stocks and shares of many gas companies have been rendered available to the small investors among the gas consumers and the companies' employees; and this movement has had a very conspicuous measure of success. An eminent example is found by dissecting the lists of the proprietary of the South Metropolitan Gas Company. Two or three months ago, the total number of proprietors on the books was 14,804; but of these 8263 are consumers and 4119 employees. In other words, there are only 2422 proprietors who are not identified with the Company either as customers or workers or both. These figures indicate how widely much of the capital is distributed in comparatively small amounts, and also what impetus has been given to thrift by the legislation that facilitated the acquisition of stock—that facilitated the investment of small amounts of savings—in the Company. But through the definite line of differentiation proposed to be drawn between earned and unearned incomes—between the taxing of earnings and property—large numbers of these small investors will pay income-tax on the higher scale of 1s. instead of on the lower scale of 9d. Differentiation has to be accepted; and we have no great objection to it provided the demarcation could be such as to leave slender (so-designated) unearned incomes among those taxed on the lower scale.

A Danger to Industry.

There is great danger that, by the united exertions of the labour members of Parliament, the Government—very pliant where labour is concerned—will be moved to give, piece by piece, such a large amount of power to labour that labour will be in a position to very seriously harass industry. We have had important samples of measures conferring such power; and there are others awaiting consideration. Among them is the Miners' Eight Hour Bill, which was introduced by the labour members in face of the fact that a Departmental Committee are sitting considering the whole subject, and whose report is expected somewhere about Whitsuntide. The labour members have not much faith in anything that is not initiated in their midst. Therefore, when their Bill came up for second reading, it was politely referred to the Committee on Trade, which Committee reported the Bill without amendment, on the ground that the information at their disposal was insufficient to enable amendments to be properly considered. Action must now follow the report of the Departmental Committee; but the labour members have, by their Bill, so far forced the hands of the Government that, prior to receiving the Departmental Committee's report, and so before its recommendations are known, the Home Secretary has given an assurance that the Government will bring in a Bill, as soon afterwards as possible, to shorten the hours of labour in mines. It has been pointed out in the "JOURNAL" that this shortening of the hours of labour in mines will mean a certain—not much perhaps per ton, but still a permanent—advance in the price of coal, which will adversely affect industry. Sir George Livesey has shown the Departmental Committee (as will be seen in the report published this week) how much the gas industry is concerned in, and how greatly gas consumers are affected by, increased coal costs; and his figures make interesting reading in conjunction with those published in our editorial columns a fortnight since. What is greatly to be feared is that these increased powers that Parliament appear willing to grant with so much alacrity, will lead to the whole coal industry being placed under the control of one consolidated union; and Sir George does not like the look of this. He holds that, if Parliament strengthens the power of combination on the part of the producer, Parliament ought to make provision, *pari passu*, for the protection of the consumer. That is only righteous; and we hope these views will have due weight and effect.

Prices and Competition in Buenos Ayres.

A fortnight ago, the report of the proceedings at the River Plate Gas Company's meeting was given in the "JOURNAL;" and in this issue similar reports are published of the meetings of the Primitiva and Buenos Ayres (New) Gas Companies. This completes the review of the past year's operations of the three competing Gas Companies in the City of Buenos Ayres. The Companies are all prosperous—remarkably so, in fact; and the consumption of gas is advancing rapidly, so much so that good percentage augmentations are recorded, which fact shows that extended custom and the use of gas for purposes other than lighting have kept the concerns a long way ahead of anything they have lost by the reduced consumption which necessarily accompanies the supersession of the old flat-flame burner by the incandescent system. But we cannot help thinking the competitive system under which Buenos Ayres is supplied with gas is a wasteful one for the consumers, who have to pay rather dearly for all the unnecessary capital expenditure involved by the competition. We are afraid, too, from what transpired at the last two meetings, that the consumers are not receiving the advantage that is supposed to accrue from competition—viz., competitive prices. In the matter of a general reduction, Mr. H. E. Jones, the Chairman of the Primitiva Company, has taken up the cudgels on behalf of the consumers; and, from what he says, it is pretty clear that, without some concerted action by the Companies, the price cannot very well be reduced by any one of them. We are not advocating here competitive prices for an underground distributed commodity; the public trouble produced by them, through constantly disordered streets and the waste of capital involved in distribution work, more than counterbalances all the good that competitive prices can do. It is possibly on this account that any one or two of the three Companies desiring to reduce the price of gas to the consumers cannot very well do so without the others or other one agreeing to follow suit; but there ought surely to be some power to see that—on the time arriving when all three Companies can, without injury to themselves, reduce the price, while receiving a fair dividend on their capital—nothing is allowed to stand in the way of the consumers obtaining the general benefit. The drawbacks and the unprofitableness of competition in the case of a public supply such as gas, where the commodity requires leading right up to the point of consumption, is shown by one illustration drawn from Mr. Jones's speech at the Primitiva meeting. He mentioned that, while the Company had 45,000 services fixed, they had only 25,000 meters; so that they have 20,000 services lying idle. We have no doubt the experience is the same in the case of the other two Companies; so that there must have been a vast amount of capital unprofitably sunk in the streets of Buenos Ayres through the mistaken belief of the authorities that it would produce an economic condition of things for consumers. It is a false notion that competition (resulting

in heavy capital expenditure) in gas supply will produce a low price; the sliding-scale of price and dividend, supplemented by the competition of electricity, is a more effective agent in that way.

A Junior Conversazione.

It is impossible to let this opportunity pass without tendering to the London and Southern District Junior Gas Association our hearty congratulations on the eminent success which attended the "social-technical" or "technical-social" function which was carried out on Saturday night, as recorded elsewhere in this issue. It was an altogether new departure, and was not decided upon without careful thought; for it was admittedly a somewhat big undertaking. But the organizers worked with a will, and effectually demonstrated that it was not a bit too big for them. Credit is due to all the workers; for while it was stated in connection with the votes of thanks that the energetic President (Mr. W. Upton) conceived the idea, he in his turn admitted that, without practical men to aid him, it would have remained an idea. An excellent session has been brought to a close in an excellent manner; and the funds of the Association could not possibly have been better utilized. A series of practical papers and instructive visits, followed by such a first-class display of gas appliances of all sorts as was gathered together on Saturday, cannot fail to carry conviction as to the extreme usefulness of the Association to the members. In the exhibition alone, there was sufficient to fully occupy one's attention for several evenings—in fact, as somebody remarked in the hall, it was really "a miniature Earl's Court." But, in addition, there were several speeches by gentlemen whose experience enabled them to give advice which is well worthy of the most careful consideration by those to whom it was addressed. These speeches were good hearing; and there is no doubt they will prove equally good reading—for the keynote was one of hopefulness for those who are embracing the gas profession as a means of livelihood. While the Association keeps along its present lines, it is perfectly safe to predict for it a career of increasing usefulness and prosperity. We cannot fittingly conclude this brief reference without mention of the gratifying presentation to Mr. Walter Grafton, to whom, as President during the first years of the Association's existence, the gratitude of the members is certainly due. Mr. Grafton worked very hard in the interests of the Association; and though it was to him clearly a labour of love, it was none the less fitting that his efforts should be—as we are glad to see they have been—acknowledged in a tangible manner. He can contemplate this mark of the members' appreciation with the reflection that it was thoroughly well deserved.

Gas v. Steam.

It is one of the expected results of the competition of cheaper town's gas, suction gas plant, and so forth, that it would make an impression upon the businesses of the producers of steam plants. Mr. John Dewrance, presiding the other day at the annual meeting of Messrs. Babcock and Wilcox, Limited, was very guarded in what he had to say as to the future of the competition. But this he did admit, that there is no question that, for small powers, gas and electricity have cut into the Company's business. The Company are at the present time doing a great deal less in small steam plants than they did in the past. But for large powers, there has been no diminution in the volume of the demand for their boilers. The Company ought to consider it providential that the cutting into their business has commenced at the small end; and they should not neglect the warning. It would not be difficult for a firm of such repute to start swimming with this particular tide at any time. Gas suppliers will also note this sign of the times, and not neglect any opportunity of doing what is necessary to meet the still growing preference for gas, instead of steam, for small power plants.

The "Neath Gazette" for last Saturday contained a portrait of Mr. R. A. Browning, Assoc.M.Inst.C.E., the retiring President of the Wales and Monmouthshire District Institution of Gas Engineers and Managers (the proceedings at whose half-yearly meeting, held last Wednesday, are reported elsewhere), with a short sketch of his career. When Mr. Browning was appointed Gas Engineer, Manager, and Secretary to the Neath Corporation, the price of gas was 5s. per 1000 cubic feet. Now it is 3s. In the past two years, £1000 a year has been allocated from the gas profits in reduction of the rates. Mr. Browning is a Past Master of the Cambrian Lodge of Freemasons.

NOTES FROM WESTMINSTER.

THERE were few gas topics last week engaging consideration, excepting in an incidental manner, in either House. The Removal of Sulphur Restrictions Bill has had its third reading in the House of Lords; and so has practically ended its happy and uneventful journey. Those few companies who are left with the burden of the sulphur restrictions round their necks may now or hereafter wish that they had not permitted the passing fear of attracting the attention of the local authorities to themselves to stand in the way of obtaining—if they did not use it in any other way than for self-protection—this relief from an exacting condition of manufacture. The consideration in the House of Commons of the question of the restoration of the no-allowance-for-compulsory-purchase clause in the Hull Bill has been postponed until May 13. But meantime the House has been relieved of the duty of refusing, in the case of the Worthing Gas Bill, to upset a deliberate verdict given by the Select Committee on that Bill by deleting the schedule which defines the new site at Goring upon which the Company desire to erect works. If the House in one case gives a fairly plain intimation that it is indisposed to interfere with the decision of a Select Committee on a point that has been specifically discussed before them, then equally, it may be imagined, the House will decline to interfere with the judgment of the Police and Sanitary Committee on a specific matter such as that of the customary allowance for compulsory purchase. However, Mr. Ridsdale, who withdrew his motion as to site in the Worthing case, has given notice of his intention to move the rejection of the Gas Company's Bill. It may be suggested to Mr. Ferrens, the mover for the restoration of the non allowance clause in the Hull Bill, that, if he does not succeed in this, he should follow Mr. Ridsdale's lead, and move the rejection of the Hull measure. We have our doubts as to whether he will adopt the suggestion. A number of Water Bills have been before Committees of the House of Lords during the week. To-day has been fixed for the commencement of the consideration by a Joint Committee of the Lords and Commons of the Metropolitan Water Board Bill, which is threatened with vigorous opposition, particularly on the proposal that the annual charge shall be 5 per cent. on the rateable value of the property supplied with water. The measure, it may be remembered, seeks to provide a uniform charge throughout London.

Decisions of Select Committees. Reverting to the matter of the antagonism that has been shown to the Worthing Gas Company's Bill. There were two main points brought before the House, by the request of Mr. Ridsdale that the site proposed for the Company's works should be rejected. On the one hand, the House were invited to dismiss as worthless—without any evidence, but on the mere *ipse dixit* of one or two members of the House—the contention of the Gas Company, which had been accepted by the Select Committee, after very full consideration of the alternative sites brought before them, that the Goring site was the best possible for their works. To accept such an invitation would be to subject to ridicule the whole of the machinery that Parliament has set up to deal with Private Bill legislation, with the view of saving the time of the House, and to give the best possible safeguard to the interests of all affected in any way by the proposals of a Bill. And in this we have the second main point. It would be going too far to say that the machinery always works perfectly, and that the protection afforded is complete. At the same time, for the House to create such a precedent (the Chairman of Committees tells us there has been no such precedent yet) as to reject, offhand, a verdict of one of their own appointed Committees who have considered the *pros* and *cons* advanced in a case, would create a feeling of uncertainty and detract from responsibility, which would be very harmful to the administration of justice by Select Committees. There is always, where a measure is kept alive in one House, the protection afforded by the second House. The view of the House of Commons was distinctly against the interference with the decision suggested by Mr. Ridsdale; and expressions of that view, we are glad to see, came from both sides of the House. Mr. Ridsdale consequently withdrew his motion; but, as already mentioned, he has given notice of another for the rejection of the Bill on its third reading. Evidently pressure has been again brought to bear upon him. It is to be hoped the House will be careful not to play into the hands of a few interested landowners, and so do injury to a Company administering a public service. The Company have already over this site question been more than sufficiently hustled from pillar to post.

Llandrindod Wells Gas Bill. The Llandrindod Wells Gas Bill has introduced certain interesting features, as previous notes on the measure have shown. Another one which came to the surface the other day, before Lord Onslow, was a clause that has been incorporated in the Bill with others in settling with the Local Authority. This particular clause reminds one of the purchase powers granted to Local Authorities under the Electric Lighting Acts. If (the clause reads), within six months after the expiration of 21 years after the passing of this Act, the Council serve notice on the Company requiring them to sell, the Company are to do so, and the Council are to purchase, in accordance with defined conditions. This little Bill looks as though it is carving out for itself a special place in the history of gas legislation.

Company Promotion. If anyone has any appreciation of humour he should read the report of the proceedings before Earl Lauderdale's Committee on the Selsey Water and Gas Bill. Those who are responsible for the introduction of this Bill are well known as the promoters of other Bills that, in connection with their financial aspects, have not been adjudged as altogether commendable by men competent to judge in the gas industry. This Selsey Bill shows how Parliament are treated by speculative promoters, about whose previous gas and water schemes there is an abundance of information available. The Hon. J. D. Fitzgerald described the promotors in this instance as men of straw. The name of the real promoter is kept in the background. It is quite true that one of the persons named in the Bill is the caretaker of offices in the City, and other two are clerks in a City office. With the respectable vocation of caretaker, the gentleman referred to combines, we understand, the duties of a director. According to one's business with him, the caretaker can be approached as such or as a company director. Not one of the three persons named as promoters in the Bill, Mr. Fitzgerald also declared, had put a single shilling into the Selsey promotion, nor had they any intention of doing so. These striking allegations notwithstanding, the Lords Committee allowed the Bill to proceed. The hollowness of the whole scheme should have been detected by the scheme itself as presented. The Bill in its essential parts is not the Bill that was promoted. The gas part of the Bill has been withdrawn, because the promoters, or it would be more exact to say the promoter, had not succeeded in agreeing with the Petersfield Gas Company, the Selsey part of whose undertaking was to be transferred to form the nucleus of the new undertaking. The Petersfield Company have enough burden to bear as the result of over-capitalization, without being parties to other similar schemes at present. The proposal to construct water-works has also been abandoned in favour of a scheme for taking water in bulk from the Chichester Corporation, and constructing nothing more than a distribution system. Originally the proposed capital stood at £32,000 when there was a part of a gas undertaking to acquire and water-works to construct; but now, although there is only a water distribution system to lay down, which will be connected up to a 5-inch main—a 5-inch one, be it noted, will suffice—from Chichester, £20,000 is considered a proper capital for this emaciated project. Only £12,000 gone, although the gas-works and water-works projects have been dropped! Yet, we again point out, Earl Lauderdale's Committee allowed this Bill to proceed. We want to know what a company, or a speculative company promoter, can want with £20,000 of capital for merely providing a water-distribution system for Selsey. It would also be interesting to know what the Lords Committee were thinking about in allowing this scheme to pass them at all.

Water Schemes. Committees of the House of Lords have been engaged all the week on water projects. The Earl of Lauderdale's Committee have had before them the Tynemouth Corporation Water Bill; and Lord Ribblesdale's Committee have had under consideration the Southport, Birkdale, and West Lancashire Bill, the Ashton, Dukinfield and District Water Bill, and the Colne Valley Water Company's Bill, the last-named of which was still under consideration when the Committee rose for the week. The same with the Tynemouth Bill. Very little need be said about any one of these Bills; those interested will read the ordinary reports. Water schemes are different to all other projects that come before Parliament for sanction. Local conditions must be the controlling factors from source of supply to consumer's tap, as well as of the rates to be charged. Everything is, in fact, so purely local that, unless some exceptional point of principle crops up, there can be no general interest. Take, for example, the Tynemouth Corporation Bill. The Corporation are asking Parliament to allow them to extend their area of supply, so as to enable them to supply in bulk, and to authorize the construction of additional water-works. Some local authorities want the Corporation to obtain the powers; others do not. There are ten opponents, public and private—some affirming that their local water supplies are ample in quantity and efficient in quality, which the Corporation and their witnesses deny; while others will be glad enough to have the assistance of the Corporation, but are anxious to make favourable bargains as to price. Our space here is not equal to their diverse wants; and so, in these notes, we shall content ourselves with recording the general result of the measure. The Colne Valley Water Bill is another case in point. Here the Company want further capital powers for developing the supply of their enormous district. In all, there are nine authorities, ranging from the Middlesex County Council down to Rural District Councils, to the number of nine, all waging battle over the Company's charges, which are said to be excessive. The Southport, Birkdale, and West Lancashire Board Bill recalls the fight that took place in 1905, when the Board obtained power to sink a well at Bickerstaffe. Then Parliament gave Skelmersdale a protective clause in respect of the well at their pumping-station at Scarth Hill. Since that time the Board have agreed to purchase the well and main; and to supply their old opponents with water in bulk. The advantages are mutual. But the purchase by the Board of the Scarth Hill pumping-station induced the District Councils of Ormskirk and Lathom to fear that the operations of the Board would jeopardize the water yield of their pumping-stations which are within a mile-and-a-half of Scarth Hill; and therefore they appeared before Lord Ribblesdale's Committee as opponents. But after a day's discussion, the promoters expressed their willingness to be limited to the pumping of 250,000 gallons a day from Scarth Hill, or not more than 300,000 gallons on any one day; and engine records are to be kept, for the satisfaction of the Councils that the limit is not exceeded. In the case of the Ashton, Dukinfield, and District Joint Water Committee's Bill, the promoters asked for an extension of the time for the construction of the Chew reservoir and other works for ten years, and to purchase certain estates. Local authorities in the area of supply thought the opportunity a convenient one for getting relief from a 25 per cent. excess that they are called upon to pay, being outside the partnership represented by the Committee. But the Joint Committee, in the course of the proceedings, showed every disposition to receive into partnership all local authorities concerned, on terms if only they would get Parliamentary sanction. After this offer was made, neither of the parties cared to get to too close quarters with regard to it; it being something that required careful examination and cross-examination before committing their constituencies to it. However, the Parliamentary Committee rendered the outside districts some alleviation, by reducing the excess charge to 10 per cent. A clause was also incorporated, giving protection against plumbism; and the West Riding County Council were invested with the responsibility of seeing that it is carried out. The Birkenhead Corporation Water Bill commenced its Committee course on Friday; the Committee dealing with it being presided over by Lord Newton. It is a big measure; and further reference to it may be deferred.

OBITUARY.

The death occurred last Thursday of Mr. R. T. Campion, the Chairman of the Exeter Gas Company. Deceased was an ardent supporter of the Volunteer movement, and was for many years Hon. Secretary of the Devon County Volunteer Association.

A veteran in the gas industry has just been removed by the recent death, in his 85th year, of Mr. Frederick Doughty, of Margate. Deceased entered the service of the Isle of Thanet Gas Company as a lad, and gradually advanced until he became Manager of the works, in which capacity he carried out many structural alterations, under the supervision of the Company's Engineers, Messrs. Robert and H. E. Jones. After about 54 years' service, he retired in 1894, and was succeeded by Mr. H. H. Jones, who had been Assistant Manager of the Bombay Gas Company. Mr. Doughty was well known in the gas profession, and was regarded as an able carbonizer. His funeral took place on the 1st inst., and was attended by the Directors and the general staff and workmen of the Company, as well as by a large number of personal friends.

We regret to record the decease of Mr. George Hodson, the senior partner in the firm of Messrs. George and F. W. Hodson, Consulting Engineers, of Loughborough. A short time ago he took a chill which developed into pleuro-pneumonia, to which he succumbed on the 25th ult., after an illness of two weeks. Mr. Hodson was a member of the Institution of Civil Engineers, of the Association of Municipal and County Engineers, and of the Association of Water Engineers, and a Fellow of the Geological Society, of the Surveyors' Institution, and of the Sanitary Institute. He made a special study of hydraulic and sanitary engineering; and the firm were concerned, as Engineers, in numerous schemes of water supply and sewage disposal throughout the country. They also had a large professional parliamentary connection; Mr. Hodson being held in high repute as an expert witness. He was also largely occupied with arbitration work. In his own town he rendered great service on water supply matters; it being chiefly through his instrumentality that Loughborough secured the Blackbrook watershed, where last year there was completed a large masonry dam impounding upwards of 500 million gallons of water in a lake nearly a mile long. The deceased gentleman, who was in his 63rd year, left a widow and family. His eldest son, Mr. Frederic Walter Hodson, M.Inst.C.E., F.G.S., has for many years been in partnership with him.

Manchester and Yorkshire Junior Gas Associations.—The annual joint meeting of these Associations will take place next Saturday, when, through the kindness of the Directors of the Liverpool United Gas Company and Mr. E. Allen, the Engineer, a visit will be paid to the Athol Street and Eccles Street Gas-Works. An opportunity will thus be afforded of inspecting the 2½ million cubic feet inclined retort installation, and the Fiddes-Aldridge machine-stoker. Mr. Allen will meet the members at 2.30 p.m. at the Liverpool Town Hall (from which place tramcars run to the end of Athol Street) or at the Athol Street Gas-Works at 3 p.m.

The De Brouwer Installation at Nice.—It has been pointed out to us that the name of the Company who carried out the installation of De Brouwer plant at the Nice Gas-Works, in the short form given in the introductory lines of the illustrated description which appeared last week (p. 308), is liable to be mistaken for that of another firm. We therefore give the full title, which is "Compagnie Anonyme Continentale pour la Fabrication des Compteurs à Gaz et Autres Appareils, Ancienne Maison J. Brunt et Cie.," of No. 9, Rue Pétrelle, Paris, who are the sole concessionaries for France, Italy, and Spain for the De Brouwer plant for charging and discharging retorts and the mechanical conveyance of coal and coke.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 410.)

LAST week on the Stock Exchange suffered the disadvantage of having a gap in the middle of it, owing to the May Day closing, which always tends to dislocate business. The opening showed all the bad points in evidence at the finish of the week before. Consols and the choicest class of securities continued to droop; and they set a bad example to the rest. Next day the leaders were just as bad; but one or two other departments were independent enough to take a line of their own and stand firm. One of these was the American Market; and among the points now to be noted for good is the abatement of the Transatlantic fever which so long was a terror that walked by day. Wednesday was closed for the semi-annual wash and brush-up. The reopening on Thursday was deadly dull, and Consols shrank still. On Friday, when they had touched 84⅜, a turn for the better set in, and buyers could no longer resist the temptation of low prices; the result being that Consols actually showed a small advance. The improved tone prevailed through Saturday; and so the close was brighter than the opening. In the Money Market, there was an abundant supply, and rates fell to very easy figures for short loans. Discount was rather irregular, but not far out of the level. Business in the Gas Market was irregular too—some days being slack and some pretty fair; but on the whole it was rather brisker than in the week before. There was little to indicate any general tendency; and movements were few in number, slight, and irregular. In Gaslight and Coke issues, the ordinary was much below its average degree of activity; but it did not budge from the level of prices which it has so long preserved. Transactions ranged from 95¼ to 96¼. The secured issues were little dealt in; the preference changing hands at 104½ and 105¼, the debenture at 84⅜, and the maximum not being marked. South Metropolitan offered an array of transactions much greater than the recent average, and showed an improvement. The bargains marked ranged from 123¼ to 124½—a rise of 1 in the quotation. The debenture was done at 84¼. Nothing at all was marked in Commercials. In the Suburban and Provincial group, Alliance old fell a point, and ditto new was done at 14. Brentford old marked 252, Brighton original 223 and 224, and West Ham 104. In the Continental Gas Companies, business was on a very quiet line. Imperial was but little dealt in, and was inclined to be flat; the quotation falling a point. Stock changed hands at 179½ on Tuesday; but on Thursday 177 was marked. Union also was flattish, and fell a point; the ordinary being done at 119, and the preference at 140½ and 141¾. European part-paid was done at 18½, and Tuscan at 10⅞. Among the undertakings of the remoter world, Primitiva ordinary changed hands at 7¼ and 7⅛, ditto preference at 5⅜, ditto debenture at 95½ and 96½, River Plate at from 13 to 13⅛, ditto debenture at 95¼ and 95¾, and Melbourne 5 and 4½ per cent. at 101½ each.

ELECTRIC LIGHTING MEMORANDA.

A Golden Egg for Manchester Ratepayers—Reading Electricity Company's Advertising Methods—The Result in Pounds, Shillings, and Pence—Electrolysis—Municipal Effrontery—Dirty Ceilings.

FOR small mercies may the ratepayers of Manchester be truly thankful. That no doubt is the prayer at the present time for the Corporation Electricity Department. The accounts of the past year are found to be so "highly" satisfactory that the profits actually admitted, the report runs, of a contribution of £10,000 by the department to the relief of the rates. During the past six or seven years, the department has little more than paid its way. In 1900, it squeezed out a contribution of £10,000 in aid of the rates; but the exertion was so great that it was impossible to continue it. But a long rest from contribution was not immediately taken. The Department thoughtfully declined to give the ratepayers a big shock; and so in 1901, the contribution to the rates receded to £3500, and then came the retirement from contribution until the present time. Even now the sum to be transferred is a paltry one; and, while we should prefer to see these contributions to the rates in the case of the self-supporting municipal trading undertakings abolished entirely, if they are to be continued as part of the financial policy of the Corporation, then there should, in fairness, be an equality between the Gas and Electricity Departments. The Manchester gas consumers under municipal control have been "relieved" altogether of something like £3,000,000 for the "relief" of the rates. Last year, they had extracted from them for the city fund £60,000; and in the current year, owing to the higher price of coal, the Corporation are going to sacrifice a large part of the Department's reserve fund, in order to get £50,000 for the rates. When these figures are compared with the miserable odd subscriptions referred to of the Electricity Department, the unfairness of the conditions of the competition between the two undertakings is made strikingly apparent. The electricity consumers enjoy a not inconsiderable part of the money taken from the gas consumers beyond what would be necessary if the undertaking was carried on, as municipal undertakings should be, for the benefit of those citizens who accord it their patronage. The Electricity Committee appear to be desirous of doing something to appease those who have made it a matter of reproach to the Department that their customers, while taking from the gas consumers, contribute nothing in return. Yet we find that the capital expenditure of the two undertakings is similar in amount. The total capital expenditure of the Electricity Department on March 25, 1906, was £2,267,127; and at the same date, the total amount borrowed on behalf of the Gas Department, including the capitalized value of the annuities, but not deducting the amount repaid, was £2,343,023. Why, therefore, should the gas consumers have had £50,000 or £60,000 a year drawn from them, while the electricity consumers have been allowed to go free for so many years, with only an occasional break of a few thousand pounds contribution? It is time the two Departments were treated precisely the same, and be left with their surplus funds to benefit the undertakings and their own consumers.

Reading is an example of a thriving Southern town in which the gas and electricity supplies are carried on by private enterprise. The undertakings are therefore on an equal footing so far as competitive freedom is concerned. The Electricity Company have to their advantage novelty in the eyes of those people who have not tried it, and, people are asked to believe, all those other advantages with which the imagination of a hard-pressed staff choose to garb the light. Those advantages that are the product of imagination are, in the advertising literature of the Reading Electricity Company, set forth with meretricious boldness, which suggests a "may as well be hung for a sheep as a lamb" sort of spirit. We have a sample of this in a circular now before us. In it "dangerous and ruinous gas," "dirty and poisonous gas, the result of combustion," "vitiated atmosphere," and so forth are spoken of. Such statements as these are being answered in our articles entitled "Illuminating Truths for Householders," in connection with which articles we have been able to start a collection of interesting electrical comments which keep a safe distance from cardinal points. Let us assure our electrical contemporaries that such comments and such badinage will not cause any vexation of spirit, so that they may peg away as fast and foolishly as they choose. Those in charge of electricity undertakings must mend their ways, for their present ways invite retaliation. In the case of the Reading Electricity Supply Company, however, the literature they have been distributing—such as that referred to above—has not been doing them much good. We call to witness the accounts the Company have just issued. The best advice, having regard to these accounts, that those who are friends of the Company can give them is to try the effect of pursuing a fresh line of policy. The dealings in their shares compared with those in the stock of their rivals the Gas Company indicate that the public are not particularly enamoured of the results of the conduct of the electricity business. The last quotations to hand show that since November, 1903, the Gas Company's 5 per cent. stock has risen to £113—*i.e.*, an increase of £9; while the quotation for £100 (nominal) of the Electric Company's shares is par, or a fall of £26¼ in the same period. And it would not be astonishing to learn that the shares have had another drop in view of the present accounts and fall in the dividend. The fact of the matter is that good paying electricity business in such places as Reading is very hard to get. Gas consumers have been gas consumers so long that most of them are quite capable of setting their practical experience against all this fulminatory and empty talk about dangerous, ruinous, dirty, and poisonous gas. There is an old saying, full of meaning, if not always respectful, about "teaching one's grandmother to suck eggs." In that saying may be found the point of difficulty which appears to escape recognition by those managers of electricity companies who pursue the line of policy adopted by the Reading Electric Company. They are not going to get experienced gas consumers to swallow all they choose to put before them, even though they succeed in obtaining the custom of those who fancy electric lighting.

A few words on the financial results of the Reading Company. Upon an investigation of their accounts two years ago, we made the remark that, to continue to pay a 5 per cent. dividend, the Company would have to cut close to the knuckle. That has proved more than true; for the past year's result only permits of a distribution at the rate of 4 per cent. The rivalry of gas, and the sluggish flux of the electrical business, and therefore the necessity of tempting consumers, compelled a reduction of price at the beginning of 1906, and that reduction is stated to represent a concession to the consumers of over £2500. But we hazard the opinion that had the Directors known that the earnings in 1906 would be short by £409 of the amount necessary to pay a 4 per cent. dividend—a drop of 1 per cent.—they would have hesitated to have lowered the price. Directors must be very concerned as to the future of the Company to make such a sacrifice. The profit-balance on the year's working is only £5127, as against £6375 the previous year; so that, taking the whole year through, the Company only recouped half of the £2500 represented by the reduction. It may be taken that the cream of the advantage of the reduction has already been obtained; and therefore it is likely to be some time before the Company will recover the 5 per cent. dividend. As it takes £5536 to pay a 4 per cent. dividend on the present capital, it would require £6920 to pay a 5 per cent. dividend, without reckoning further capital increases; and as the profit-balance on 1906 was only £5127, an additional £1793 is needed to enable the Board to revert to the 5 per cent. distribution. As a matter of fact, the Company do not appear to be in a better position now than they were in 1903, when, with a smaller business and dearer prices, the profit-balance was £5612, as compared with the £5127 for last year. We cannot go in detail into the figures in the accounts; but generally they go to show what has been noticed before in connection not only with some provincial

electricity companies but also with the London Companies, that the conditions under which electricity business is now conducted, while producing larger outputs, tend to a reduction of the profit in proportion to the capital employed.

According to results of investigations that have been laid before the American Institute of Electrical Engineers, alternating currents are reputed to be electrolytically less offensively active than direct currents. We hope this may be so in the interests of the owners of iron and lead properties in the subsoil of our roads. One of the investigators is Mr. J. L. R. Hayden, who speaks categorically on the subject as the result of his inquiries. His tests were made with lead plates and sheet iron; but the tests, we should fancy, hardly reproduced the conditions that exist underground. However that may be, Mr. Hayden avers that, "in general," iron is attacked less than lead; and therefore it seems that, again "in general," with iron alternating current electrolysis is less to be feared, except in extreme cases—that is, with large currents passing between rails and iron pipes. But as for lead pipes or lead-covered cables, attacks on them, whether by alternating or direct current, are sure to be fatal. Among other conclusions are these, that, "in general," electrolytic corrosion by alternating currents increases with decrease of frequency. "In general," too, ammonium salts and nitrates seem to give a very great increase of electrolytic corrosion with decreasing frequency; while carbonates and soils with alkaline reaction, as containing cement, may give little or no increase of corrosion with decreasing frequency. Chemical corrosion by the soil, and electrolytic corrosion by alternating current, however, increases very greatly with increasing temperature of the soil. Professor Steinmetz has also given in America the results of research in connection with electric traction; and he likewise bears witness to lead being more vulnerable than iron to stray alternating current. "Iron," he says, "is a material which is attacked least; even wrought iron is not attacked very badly, steel very much less; and those iron carbides and silicides called cast iron are attacked hardly at all. Cast iron must therefore be regarded as very lucky.

The boldness of some local authorities is really beyond description; and the Watford District Council rank among the best of them. We have recently referred to the inquiry into a fresh electricity loan application by the Council that Mr. H. Ross Hooper has been holding; the proceedings having had to cover four sittings to enable him to arrive at facts. At the third sitting, the Inspector asked the Electrical Engineer to what he attributed the loss on the undertaking, which has shown a deficit every year now for some years. Besides which deficit, there has been no provision for reserve, and capital expenditure has been mounting up. The reply of the Engineer was to the effect that he ascribes the loss to the private lighting, and at one time to the power supply. Then it was elicited that the figures that did not pay for power supply were 2d. and 1½d. per unit; and yet the Council have entered into a five years' contract with a firm at 1d. per unit! The Engineer's assertion is that it is the private lighting at 5d. which does not pay; and this points to the absurdity of the Council's position. The Council are proposing to incur expenditure, which will make the annual charges ascend, on account of the additional plant required to earn only 1d. per unit (which does not pay), and which plant is not necessary for the business done at 5d. per unit (which also does not pay). This is a strange move, and comical commerce. We go a step further, and find that 3d. per unit does pay for public lighting; but then the Council charge the ratepayers £7 10s. for every 32-candle power electric lamp! And the Electrical Engineer coolly told the Inspector that, by extracting this price from the ratepayers for public lighting, the surplus so gained can be used for building up the private electricity business. When driven into a corner, too, by a shower of hard figures, he made the admission that he does not contend that electricity is cheaper than gas; but although a saving might be effected by lighting the streets with gas, the load-factor of the electricity undertaking would go down, and the concern would suffer. It is a piece of audacity on the part of local authorities to make the ratepayers suffer, through the public lighting or in any other way, in order to bolster up an undertaking that cannot support itself on its merits. Yet some people fume because other people scoff at the tactics of municipalities on behalf of their trading undertakings.

In a shop on Ludgate Hill some ago, where flexible wires are run across the ceiling, it was noticed that, along the complete tracks of the wires on both sides, the ceiling was very dirty. A correspondent of the "Electrical Review" calls attention to this matter. He says he is desirous of knowing the opinion of readers as to "what is the cause of blackened ceilings in the case where flex is run on the same, also the cause of blackened ceiling immediately round ceiling roses." He thinks "it is an electrical effect, as witness the accumulation of dirt on the glass of a fuse box—half of the glass is quite clean, and the other so dirty you are unable to see the fuses." The Editors of the "Review" reply: "This is a phenomenon which was much discussed some years ago. The cause is partly electrostatic attraction, and partly thermal convection currents. Something may be done to remedy the trouble by connecting all switches on the 'outer' wire (assuming that a three-wire system is in use) with the middle wire earthed. We have not met with the effect mentioned in connection with the glass covers of fuse boxes; they are easily kept clean." Some electrical engineers are now advocating the greater use of flexible wires for cheapness sake; if they succeed, there will be other places than round ceiling roses where there will be blemishes owing to the use of electric light.

NATIONAL PHYSICAL LABORATORY INQUIRY.

THE fact that the Departmental Committee appointed to inquire into the work performed at the National Physical Laboratory have got to work, and are examining witnesses with extreme alacrity, has not availed to stop the raising of questions in the House of Commons with reference to the proceedings of the Laboratory and the Committee of Inquiry. Four questions were last week asked by Mr. Nield and answered by Mr. Runciman, the Secretary to the Treasury. They deserve brief notice.

The first one dealt with work of the class which prior to the establishment of the Laboratory was carried out at the Kew Observatory. The latter institution, according to the report of the Treasury Committee of 1898, received for the verification and testing of instruments fees amounting to about £2000 per annum. It had also a small endowment, which has been transferred to the National Physical Laboratory. The 1898 report stated: "The institution is self-supporting, and has usually a small annual balance which is devoted to scientific investigation and to the extension of the work, including the erection of new buildings, when required." Mr. Nield inquired for the amounts of the fees received by the National Physical Laboratory during the past three years in respect of work of the class previously carried out at Kew, and whether this class of work was self-supporting, as formerly. Mr. Runciman replied that the fees received during the past three years for this class of work amounted to £3680 13s. 8d., £4225 12s. 9d., and £4645 3s. 9d. respectively. The work was not now self-supporting; but he thought the comparison in this respect unfair! No doubt the executive of the National Physical Laboratory also considers it unfair, seeing that it convicts it of less economical administration than prevailed at the Kew Observatory. With a greatly enhanced income, the credit balance has disappeared, and there is a loss on working. Part of the funds provided by the State and subscribers for physical research goes instead to support work of a class which the Kew Observatory could make not only self-supporting but even profitable.

Another question was as to whether it was competent for the present Committee of Inquiry to report in favour of the reconstitution of the Executive Committee of the Laboratory, in order that it might "include representatives of bodies not now represented, such as the Institute of Chemistry, the Institution of Gas Engineers, and the Surveyors' Institution, and also representative independent consultants," and might give ampler representation to technical and industrial bodies already represented. Mr. Runciman said that the Committee had already taken evidence on such questions, and their recommendations on them would receive consideration by the Treasury. So far as it goes, this answer must be accepted as satisfactory.

A third question pointed out that the terms of reference to the present Committee instructed it to report on the lines on which further *development* of the work of the Laboratory should proceed, and asked that, as the work had already developed in directions expressly excluded by the report of the 1898 Committee, the option of reporting as to the *restriction* of the work should be given to the present Committee. Mr. Runciman stated that he considered the terms of reference, read *en bloc*, gave the Committee the option of recommending either development or restriction of the work of the Laboratory. If the Committee will bear in mind Mr. Runciman's interpretation of the terms of reference, and act accordingly, all may be well; but it would have been better to have re-cast the terms of reference in unmistakable language.

The last question to which we have to refer secured the briefest answer—viz., "No, sir." It was as to whether prospective witnesses who, either personally or as spokesmen of institutions, objected to giving evidence before the present Committee, on the ground that they distrusted its impartiality, would be given an opportunity of laying their views before the Treasury before any action based on the report of the Committee was taken. The answer should serve as a useful guide to witnesses and institutions doubtful, in view of the improper constitution of the Committee, as to their best course of action. Clearly, they will injure their cause by refusing evidence. They can find appropriate opportunity for associating with their names a dignified protest against the composition of the Committee of Inquiry.

Production of Coke and its Application in Domestic Fires.—Our readers may be reminded that this is the subject of a paper to be read at the meeting of the Society of Arts to-morrow evening by Mr. Paul Schlicht. It is one in which gas companies are specially interested, as evidenced by the fact that Mr. Corbet Woodall has promised to preside on the occasion. It may be hoped that he will have before him a good gathering to discuss the points raised by the author in his paper.

Revivification of Gas Purifying Materials.—Mr. H. L. Doherty, of Madison (Wis.), has taken out a patent for a process for revivifying gas-purifying materials. The spent oxide is re-oxidized by a regulated current of air diluted with indifferent gases, the temperatures not being allowed to rise above 120° Fahr. by the following process: A quantity of an indifferent gas is passed through the oxide in a closed circuit, and the gas is gradually replaced by air in inverse proportion to the tendency of the oxides to rise in temperature. The gas circuit initially includes a cooler; the oxidation is completed by the final circulation of pure warm air.

THE IRISH INTERNATIONAL EXHIBITION.

Impressive indeed is the grand exhibition which long and strenuous labour has planted in Dublin, and into the enjoyment of which the capital city of the sister isle entered on Saturday, when the Lord Lieutenant of Ireland, in full state, and in the midst of a magnificent assemblage, performed the opening ceremony.

The exhibition is a credit to Dublin; and it will be the loadstone that will draw visitors from all parts of the earth, and the cynosure of the city itself, for some few months to come. The towering and extensive buildings are, though temporary and only imitations of the stately in architectural art, striking in their picturesqueness and simulated massiveness—the prominent feature being the central palace, with its vast dome 150 feet in height and of a diameter little less than that of St. Paul's Cathedral. The 52 acres of beautiful grounds that the exhibition covers have indeed been skilfully utilized, so as to realize extensive buildings for display and recreation, and at the same time to give the relief and attractiveness of summer outdoor entertainment. From among the beautiful and spacious buildings, engineers generally will naturally seek out the Palace of Mechanical Arts, which is 900 feet in length, and 100 feet in width, with therefore a superficial area of 90,000 feet. This large space is divided into four sections—illustrating transportation, engineering, machinery in motion, and generating plant for lighting and power. Gas engineers will give special attention to the Gas Pavilion, the superficial area of which is something like 200 feet by 80 feet, with main passage-ways about 10 feet wide between the groups of stands. To the consumers' end of the gas business, naturally in a popular exhibition of this kind, most prominence is given; but representative firms are illustrating—by models, photographs, and actual goods on the smaller scale—some of the manufacturing features of coal gas production. Upon Mr. Francis T. Cotton the work of organizing the section has fallen; and it has been for him a time of difficulty and stress. There has been great unwillingness on the part of manufacturers to go the distance and to exhibit for such a length of time as is involved by the duration of the exhibition; and, moreover, in negotiating with the manufacturers, there have been the difficulties raised by the counter-attractions of the exhibition at Manchester. Under the circumstances, the more honour to those who are taking part in the Dublin Exhibition. However, taken as a whole, there has been created in Dublin an exposition of the arts and of commerce of which the city may be proud. To this end, time and attention have been devoted ungrudgingly and untiringly; and the reward, we may hope, is at hand.

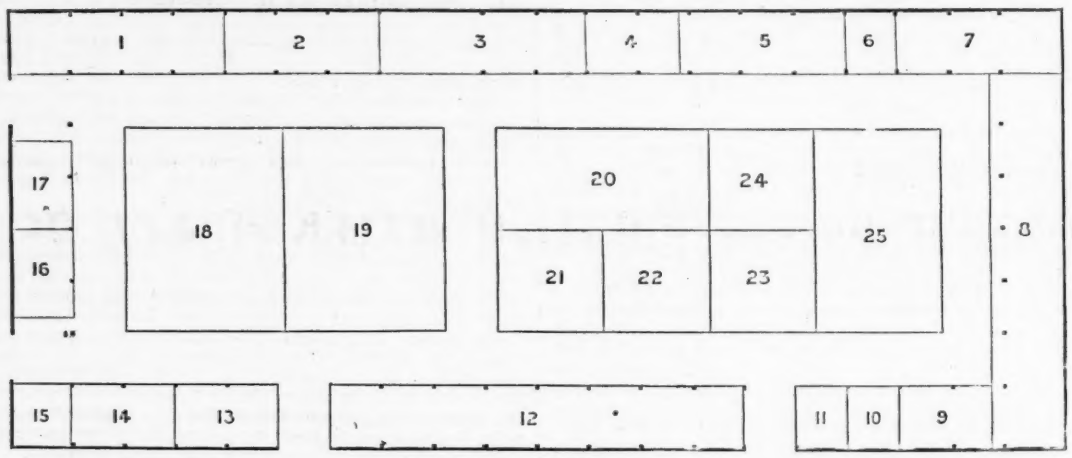
IN THE GAS SECTION.

The Gas Pavilion, which is on the left-hand side of the Morehampton Road entrance, is a lofty and spacious building, specially constructed for exhibiting modern appliances for the use of town gas. Lighting forms the principal feature of the exhibition—the latest forms of incandescent gas lighting, including inverted gas-burners, being displayed. The entire process of manufacturing incandescent mantles is also demonstrated; and there is a large assortment of gas fires and cookers of the latest designs.

A suite of furnished rooms has been fitted up and lighted with gas, including a kitchen and bath-room, with the necessary gas appliances.

As will be seen from the detailed account of the exhibits, the high-pressure gas lighting of the grounds is controlled from the Pavilion; and visitors have the fullest opportunity of seeing the process in operation.

The stands have been arranged in two central blocks, and all round the sides of the building. Our block plan will show the positions the exhibitors will occupy.



Plan of the Gas Exhibits Pavilion.

1. Welsbach Incandescent Gas Company, Ltd.
2. Anderson and Duffield, Ltd.
3. Geo. Bray and Co., Ltd.
4. W. Curtis and Sons.
5. Instrument Room.
7. High-Pressure Gas Plant.
8. Alliance and Dublin Consumers' Gas Company.
9. Richmond Gas Stove and Meter Company, Ltd.
10. Geo. Glover and Co., Ltd.
11. Falk, Stadelmann, and Co., Ltd.
12. United Chemical Works, Ltd.
13) Welsbach Incandescent
14) Gas Company, Ltd.
15. Moffat's Ltd.
16. Mobberley and Perry.
17. W. C. Holmes and Co.
18. Gas-Meter Company, Ltd.
19. Richmond Gas Stove and Meter Company, Ltd.
20. John Wright and Co., Ltd.
21. Graham, Morton, and Co.
22. Saml. Cutler and Sons.
23. Clayton, Son, and Co., Ltd.
24. Stewarts and Lloyds, Ltd.
25. British Petroleum Company.

Welsbach Incandescent Gas-Light Company, Limited.

This Company are making a splendid demonstration of their lights, of all forms and grades—from ordinary to self-intensifying lamps—from 150 to 1200 candle power. There are the popular Welsbach-Kern burners (upright and inverted), both in ordinary and gem sizes, Welsbach and Kern inverted storm-proof arc lamps, with flash-light bye-pass, and a complete exhibit of artistic pendants, fittings, and glass for both the upright and inverted systems. Then we have an installation complete, with Bartlett's self-lighters to illustrate countless installations in churches, &c.; as well as a complete exhibit of the Welsbach public lighting system, including the well-known self-intensifying lamp, as used throughout Newcastle-on-Tyne. There is displayed a wide range of glass, both beautiful in design and useful, including specimens from the Jena Glass Works, with which the Company have a direct agency. Then we have something that has never been exhibited before. It is the Company's method (Cowan's patent) of adapting existing Welsbach-Kern burners in public lamps to inverted two, three, or four light burners; the only alteration required being the gas-nipple. A wide range of Welsbach-Kern radiators, gas-cookers, boiling-rings, gas-heated steam radiators, &c., are also exposed for examination.

It may be mentioned here that the main entrance-hall and staircase are lighted by 49 Welsbach self-intensifying lamps, giving an aggregate illuminating power of about 20,000 candles. The Gas Section of the Exhibition is also lighted by 17 self-intensifying lamps giving an aggregate illuminating power of 10,000 candles.

Messrs. Anderson and Duffield, Limited.

This exhibit may for convenience be divided into three sections. In the first section, we are introduced to high-power lighting by Anderson's new patent self-contained high-pressure gas-lamps—in other words, each lamp is a self-contained unit of light on the high-pressure system. A series of lamps are also exhibited, embracing circular, hexagon, and square lamps for columns and suspension, from 500-candle power upwards.

In the second section, ordinary or low-pressure incandescent lighting is demonstrated; numerous patterns of lamps being shown, designed to meet various requirements of public lighting, and the lighting of railway stations, goods yards, sidings, &c.

A feature in this section is a new form of inverted burner lamp, specially constructed for street lighting, and embodying several important features. There are also included the firm's patent

"Challenge" and other incandescent burners. Mantle protectors for street lighting are also seen, as well as an entirely new patent anti-vibrating arrangement for supporting inverted burners on pillars, brackets, pendants, &c., in such places as banks, offices, shops, factories, &c.

In the third section, attention is claimed for the "Dacolight" system of high-pressure lighting, by means of pressure-raising apparatus worked by power supplied by gas or steam engines, or from running shafting or an electric motor. A plant capable of dealing with 500 cubic feet of gas per hour is shown, driven by a ¼-horse power gas-engine, together with lamps suitable for indoor and outdoor lighting. The Machinery Hall is lighted on this system; and duplicate plant for this large installation is also on view. A fuller account of this plant and lighting appears in the description (p. 365) of the Outdoor and Machinery Hall lighting.

Messrs. Geo. Bray and Co, Limited.

The exhibit of this firm consists of incandescent gas-burners and mantles, in both upright and inverted styles, also flat-flame burners and acetylene burners.

It is claimed for the "Bray" reversible inverted burner that it has an advantage possessed by no other inverted burner on the market—viz., that it is readily adaptable to any style of gas-fitting, old or new, without the use of an adapter. It is also fitted with a patent spring globe-holder, consisting of a split ring with the usual set-screws. This combination of split ring and set-screws enables globes of varying sizes to be used; the flexibility of the ring obviating damage to the globe through the set-screws being screwed up too tightly, as in the old-fashioned way. Further, once the set-screws have been adjusted for any particular size of globe, they need not be disturbed, as, by expanding the ring by pressure on the two thumb-pieces, the globe can be easily removed and replaced without touching the screws—thus giving easy access to the burner for cleaning purposes, or for renewing the mantle. It will be observed from the illustration, that with this burner the fittings are well away from the path of the products of combustion; thus avoiding the blackening of the fittings, and thereby overcoming one of the main objections to the inverted system of incandescent gas lighting.

Bray's Types of Incandescent Burners.

There is on view another speciality for the season 1907-8. It is the new "Bray" vertical inverted burner, which is also fitted with the patent spring globe-holder as in the case of the "Bray" reversible inverted burner. The new burner gives a brilliant downward light without shadow, is decorative in appearance, and is suitable for the most artistic gas-fittings. The position of the earthenware deflector above the globe is such that it is easily accessible for cleaning without removing either the mantle or the globe; and it also acts as a reflector.

The firm are also exhibiting a new upright "C" burner, which they are placing on the market this season, and which yields 24-candle power per foot of gas, without a chimney. The burner is fitted with the "Bray" patent non-corrosive tip, which is so constructed that the use of wire gauze is entirely obviated, and, being manufactured of non-corrosive material, it cannot burn out. It is claimed for this burner top that dust will not adhere to it, as is the case with wire gauze; hence the burner will last a whole season without cleaning. By that time, the burner may have collected some amount of dust (as is common with all incandescent burners); but the burner is so constructed that the vital parts can be instantly cleared without removing the mantle or glass-ware.

A feature that will claim special attention is the "Bray" patent gas adjuster, which can be fitted to all the firm's incandescent burners, either upright or inverted, and which is declared to be the only device that enables the user to adjust the supply of gas to the burner without decreasing the pressure. By this adjustment of gas, perfect combustion is ensured, and the highest lighting efficiency may be obtained with any quality and pressure of gas and shape of mantle.

To complete our mention of the incandescent section, there is the "Bray" "XXX" mantle on view. It is of double-woven ramie fibre, specially toughened. Exceptional durability and brilliancy are claimed for the mantle.

A useful range of anti-vibrating gas pendants, in both upright and inverted styles, are seen on the stand. They have been designed for use with the "Bray" incandescent gas-burners.

We are reminded that flat-flame burners are not yet altogether things of the past. There are here exposed the firm's "Special" burner made in the union-jet, batswing, and slit-union types, to suit any pressure or quality of gas.

In the acetylene section is included the "Elta" burner, which is asserted to be the most perfect of any made for acetylene. Before this burner was introduced, the user of acetylene was obliged to either employ his burner full on or turn it out altogether. To-day the "Elta" burners (or such burners as are licensed and made under Messrs. Bray and Co.'s patents) are, it is claimed, the only ones for acetylene which can be turned down like ordinary coal-gas burners, and left to burn that way without depositing carbon on the burner-tips.

Messrs. W. Curtis and Sons.

In addition to an exhibit in the Mechanical Arts Section, Messrs. W. Curtis and Sons, of Dublin, are showing in the Gas Pavilion some fine specimens of gas-fittings of all kinds, including lamps, pendants, and brackets—ranging from those that remind one of "the good old times" (and which many who are not easily carried away by present-day changes will be glad to see can still be obtained) down to the newest dainty inverted fittings. The firm also show samples of church lighting, including coronas, brackets, standards, &c. A special display of the "Nico" improved inverted burners and fittings is seen, with pendants, brackets, lamps, &c. In addition to most other makes of burners, and some of the latest novelties, Messrs. Curtis and Sons show several samples of pendants and brackets with inverted mantles, but which, by an ingenious device, they say, "do away with the appearance and cost of inverted burners, while the illuminating effect is not in the least impaired." To many, their display of laboratory fittings will be of interest; and, as agents for Messrs. Fletcher, Russell, and Co., Ltd., they are exhibiting numerous samples in this line. There are to be seen many novelties in the gas-lighting line, including the new "Breelit" automatic self-lighter for incandescent burners.

The Instrument Room.

This room has been fitted with gas-testing apparatus; and some of the exhibits will be found particularly interesting by professional visitors. The apparatus does not call for description beyond the mere mention of the types on view. There are to be seen a double standard photometer for testing incandescent and high-power lamps of all types, a Simmance-Abady calorimeter, a Boys' calorimeter, different forms of gas-pressure and exhaust registers, and a "Rapid-Reading" photometer (the instrument used by makers of carburetted water gas for ascertaining the value of the gas being made). A photometer is shown prepared in accordance with the new model clause suggested by the Institution of Gas Engineers, for substitution for the clause in the Gas-Works Clauses Act. This is an open-bar photometer, incorporating the 10-candle pentane lamp, and the Carpenter No. 2 "Metropolitan" burner. There is also shown a Gas Referees' table photometer; and another exhibit is a Simmance-Abady specific gravity bell.

Messrs. Pim Bros., Ltd., and the Alliance Consumers' Gas Company.

THE GAS LIGHTED AND HEATED SUITE OF ROOMS.

A very interesting exhibit in the Gas Section is that of Messrs. Pim Brothers, Limited, who, in conjunction with the Alliance and Dublin Consumers' Gas Company, have furnished a suite of fine rooms comprising kitchen, dining-room, drawing-room, bedroom and bath-room. The rooms are at the end of the pavilion, and an elaborate front has been erected in a series of arches, one of which forms an entrance to each room.

KITCHEN: The principal feature of the kitchen is, of course, the cooking arrangements, which are of the most up-to-date style, comprising—(1) A combined gas cooking and heating kitchen range. (2) An instantaneous water-heater, fixed over the sink, which will supply boiling water or only moderately heated water, as required, simply by turning on a tap. (3) A gas-griller for breakfast purposes. (4) A handy little scone-baking plate, for the preparation in quick time of all kinds of small pastries. Th facilities prove the most up-to-date means for preparing all meals in the shortest possible time, with the least amount of labour, and in the most completely cooked condition for the table. The furniture, which has been specially designed and made by Messrs. Pim Bros., presents many points of interest to a housewife.

DINING-ROOM: On passing into the dining-room, the visitor is at once struck with the beautiful harmony of the room, which has been erected in the Renaissance style. The walls are covered with paper of a warm red tone, with a stencilled frieze to match, while the floor is covered with a luxurious Donegal carpet, designed specially to correspond. The massively carved oak sideboard, table, dinner waggon, and chairs, covered in embossed morocco leather, which have been manufactured in Messrs. Pims' own workshops, combine to form an effect which one cannot help appreciating. A specially designed gas-heating appliance is here fitted in a manner best calculated to give out the necessary heat, and provide efficient means for carrying away the products and waste heat.

DRAWING-ROOM: On leaving the dining-room one enters the drawing-room, which is decorated in what is generally accepted in this country as Louis XV. style. It is a panelled room, with a painted ceiling, and the floor is covered with a beautiful Donegal carpet. There are some very fine examples of pieces of furniture

of the period, as well as some luxuriously upholstered couches and easy chairs. An ornamental gas log fire is here fitted into a tiled recess; and as well as having the very pleasant glare of the burning logs, gives out a most comfortable heating effect immediately it is lit. This is very necessary for drawing-room use, where it is not always desirable or convenient to light a fire a long time beforehand.

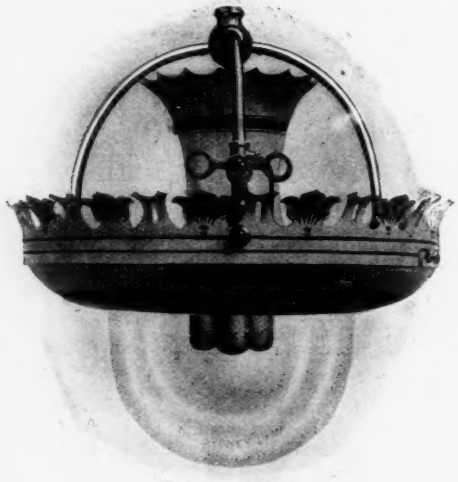
Bed-Room: The bed-room, into which one passes from the drawing-room, contains a handsome mahogany suite. It is quite original in design, and contains some fine quartered mahogany panels, executed in a very complete manner by Messrs. Pim Bros. The decoration has been done in a simple manner; the paper being an old English rose design, with frieze to correspond, and a handsome Donegal carpet covers the floor. A novel form of gas heating stove is here installed, which fulfils the requirements in a manner to recommend its use, more especially in sick-rooms, where the easy regulation of the temperature is essential. The ventilating conditions obtaining from this form of gas-stove makes it the most suitable heating arrangement extant.

Bath-Room: The bath-room, situated next to this, is arranged as follows: (1) The bath-water is supplied at any required temperature—from 70° to 212° Fahr. if necessary—from an instantaneous gas-heated geyser, which automatically shuts down the gas when the water is turned off. A shower is also supplied from it, which can be regulated to any required temperature. (2) The wash-hand basin is also supplied from the geyser. (3) A handy little gas heating stove is fitted and supplied with a small boiling-ring for boiling water for any purpose when the bath is in use. A small handy towel-warming appliance is provided, which may also be used for airing clothes.

The gas-fittings have been supplied by Messrs. W. A. S. Benson and Co., of Bond Street; the gas-fires by the Carron Company and Messrs. Fletcher, Russell, and Co.; the kitchen appliances, by Messrs. Fletcher, Russell, and Co.; and the bath-room fittings by the Maughan Patent Geyser Company.

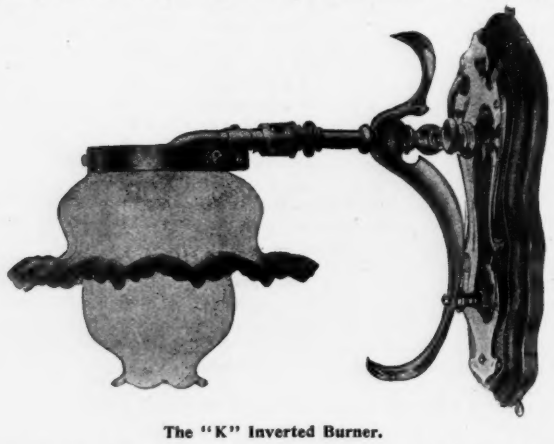
Messrs. Moffat's Limited.

Here there is a representative collection of the various lines of lighting specialities bearing the name "Lucas." Inside and outside suspension "Lucas" lamps of 200, 400, and 700 candle



Indoor Sydney Lamp.

power are shown; also a 3-light "Lucas" cluster of 600-candle power. These are all shown in plain and coloured patterns. Samples of the "Sydney" inverted cluster lamp (of 250-candle power) are on view, as well as the well-known "K" inverted



The "K" Inverted Burner.

burner. There is also a good display of inverted brackets; and one, two, and three light pendants, for ordinary and baby "K" inverted burners.

Moffat's Limited are also lighting the Entrance Hall of the Exhibition buildings, with 26 "Sydney" inverted cluster lamps, having an aggregate illuminating power of 6500-candle power.

Richmond Gas Stove and Meter Company, Limited.

Richmond's large exhibit shows a varied selection of their well-known gas apparatus. Their "Model," "Crusader," and "Academy" high-grade cookers are seen, with all interior fittings removable for cleaning, ovens lined with "Porcellanite" enamel, crown-plate also covered with this enamel, and the hot-plate fitted with removable burners, &c. Special attention is called to the patent gas and air adjuster, which can now be fitted to all the Richmond cookers, and which gives power of control in a similar efficient and simple manner to the gas-air adjuster applied to the Company's gas-fires last season.

EXISTING COLD WATER SUPPLY CISTERN
EXISTING HOT WATER SUPPLY TO BATH &c.
EXISTING HOT WATER CIRCULATING CYLINDER
EXISTING FLOW PIPE FROM COAL RANGE BOILER
EXISTING RETURN PIPE FROM COAL RANGE BOILER

The Neptune Circulating System.

Slot cookers of various kinds are on view—in fact there are no less than twenty different styles or sizes of "penny-in-the-slot" cookers, so varied has the demand become. Other goods shown on the stand are their well-known "Clyde," "Tyne," and "Mersey" grillers, in various sizes; new pattern hot-plates, suitable for lending with prepayment meters; boiling-burners; and tradesmen's stoves. Special attention is drawn to the several patterns of soldering-iron heaters which the Company manufacture, also the new crucible furnace for melting metals, glazes, and enamels, and for general purposes.

The "Neptune" Heater.

Part of the stand is devoted to showing special large cooking apparatus for hotels, restaurants, public institutions, &c.

The gas-fires on view include the new patterns "Castilian," "Basket," and "Venetian." All are fitted with the patent gas-air adjuster, and embody the latest improvements—such as burners to lift out for cleaning purposes and swing-fenders. The fires are shown both in black and "Porcellanite" enamel finishes—the latter in an assortment of colours to harmonize with the decoration of any room.

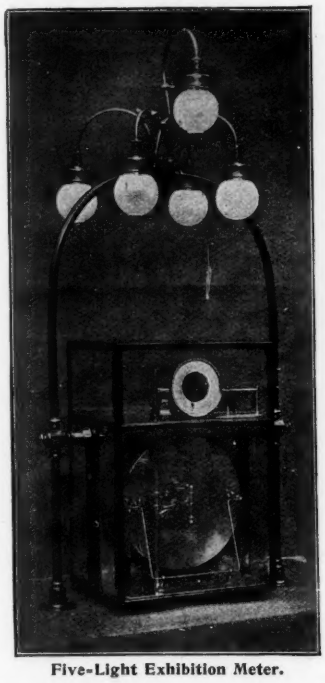
Special reference is not necessary to gas-steam radiators, samples of which, as well as selections of ordinary, condensing, and white-light radiators, are on view.

The firm have also a special space, fitted up as a bath-room &c., showing their "Neptune" circulating hot-water boiler, which overcomes the hot-water difficulty during the summer months. Other forms of gas water-heaters are the U471, "Gulf Stream,"

&c. Special attention is called to the "Blackpool" wash-house boiler and the "Economic" boiler, both of which are described as economical and efficient.

Messrs. George Glover and Co., Limited.

At the stand of Messrs. G. Glover and Co., Limited, there is a good exhibition of their glass-cased working models of dry meters, both ordinary and prepayment; the latter being of their latest improved pattern on the change wheel or price changer system. A "stop" meter of the latest pattern is on view. There is also shown a 150-light meter, which registers the consumption of one burner only, passing 6 cubic feet per hour—that is to say, one 150th of the capacity of the meter. This testimony to efficiency will be appreciated. Another exhibit is a 1000-light meter, which has been working in London for over 35 years, and which (its displacement was due to the introduction of electric light in the building where it was formerly fixed) is still capable of doing good service. In a show-case are exhibited the various parts used in making prepayment meters. The firm are proud of their framed certificates of awards at previous international exhibitions.



Five-Light Exhibition Meter.

Messrs. Falk, Stadelmann, and Co., Limited.

The main features on the stand of this firm are, of course, the "Veritas" mantles, their specialities in "C" and inverted burners, the "Vesta" inverted lamp, and the "Pharos" four-light upright cluster lamp. The firm's resources are so large in the lighting field that it is unnecessary to say that, at their stand, will be found a brilliant display of light, and a choice collection of all kinds of fittings.

United Chemical Works, Limited.

Very popular will be the exhibit of the United Chemical Works. They are demonstrating the actual manufacture of the well-known "Ino" incandescent mantles. Mantles of all sizes are seen—ranging from those required for the smallest vertical burners (only 1½ inches long) to those used for lighthouses, which are 6 inches in diameter and 8 inches long. The materials employed in their manufacture are shown in their successive stages—beginning with the original ramie filasse and raw cotton, both of which are used as the foundation of the mantles. Readers know the process employed in developing mantles; and by the display here made, the public will be educated in the operations from thread to perfected mantle. The burning-off of the mantles is accomplished ten at a time on high-pressure gas-burners. The rare earths employed in the manufacture are shown in their raw and concentrated states. The process of extraction (which necessitates elaborate and expensive plant) is not shown; these being situated at the Company's factories at London, Berlin, and Milan. Visitors are given a good notion of the extent of the work by a set of fifteen large photographs of the various departments. The Company's exhibit is a most extensive one, covering an area of 1000 square feet, and has been decorated throughout in black and gold; the signboard with the title of the Company on it runs the full length of the stand—some 80 feet.

British Petroleum Company, Limited.

If the British Petroleum Company, Limited, have not at command an extensive range of exhibits, they have succeeded in producing interest for members of the gas industry. The exhibits comprise gas-oils for gas making, a model of one of the Company's railway tank-waggons, used for transporting gas oil from their ocean installations to gas-works, and also a model of a road tank-waggon, for delivering by road where the gas-works do not have railway facilities. In addition to the models and samples of oil, there are photographs of tank-steamers and ocean storage illustrating the method of transport and storage of oils for gas-making and lamp oils.

Messrs. Mobberley and Perry.

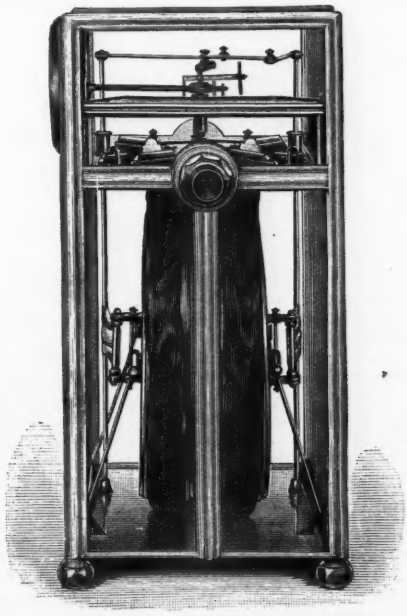
Is there, at this stand, anything of importance that is missing in the way of fire-clay goods required for gas-works? We fail to find it. It is a most comprehensive collection. There are specimens of fire-clay, fire-clay lumps (part green, part burnt), bricks of all kinds, including generator and regenerator, tiles for all purposes, air-port and other blocks, retort stays and saddles for horizontal and inclined retorts, regenerator tubes, model retorts, segmental retorts with interchangeable bottoms, segmental retorts with bottoms and springers combined, retort scurfing blocks, mouthpieces for inclined retorts, to be built in sections, retort shields, boiler seating blocks, boiler flue covers, and many other samples of the firm's work.

Messrs. W. C. Holmes and Co.

This firm have arranged an interesting exhibit. Attention is arrested by a Pelouze and Audouin tar extractor for the removal of tar and tar fog. In connection with this machine is shown one of Messrs. Holmes's patent drums, with removable plates and automatic bye-pass valves. With this construction of the Pelouze drum, it is a very simple matter to overhaul and clean the machine periodically; the whole operation of changing the plates for a clean set occupying only a few minutes. Another imposing exhibit is a rotary scrubber-washer for the extraction of ammonia, cyanogen, and benzol. The machine is full size, and embraces all the firm's latest improvements. An important feature in the machine is that it is fitted with removal brushes, by which any segment of the scrubbing material can be withdrawn from the machine through manholes arranged for the purpose. Another interesting feature is the now well-known double-faced valves, of which there are several specimens of different types, including both the vertical and horizontal forms. In connection with carburetted water-gas plant, they are also showing a special quick-opening blast-valve. One great advantage of these valves is the fact that the bonnet hand-wheel and spindle can be removed; and, if necessary, a new spindle fitted to the valve while it is still under pressure on either side. There are also seen water-valves and penstocks for sewage purposes of the latest improved form. Malleable steel and welded steel castings are submitted to inspection. The material can be made to stand any ordinary tensile strain or elongation; also castings which can be welded on to ordinary steel or wrought-iron rods. The castings are also very rapidly produced; Messrs. Holmes, we are informed, being able to turn out castings of moderate weight in three or four days. There are also on view a number of interesting drawings and photographs of actual work carried out. There is a large diagram drawing, which shows the design and arrangement of the firm's improved sulphate of ammonia plant, combined with the Claus sulphur-recovery plant. This sulphate plant is fitted with an improved form of still (having manholes and handholes for readily cleaning), and an improved form of bottom discharge saturator.

Gas-Meter Company, Limited.

Pioneer and modern work in gas-meter making are combined at this stand. We are confronted by a small meter in glass case made in 1849 by Croll and Glover; also a 1-light meter made in 1850 by the same firm. These meters bear witness to the wisdom and broad conception of requirements by these designers and makers of meters nearly sixty years ago. In this connection, a steel-plate engraving of Alexander Angus Croll, the inventor of the dry meter, will not escape the scrutiny of gas men. From



100-Light Show Glass-Cased Dry Meter.

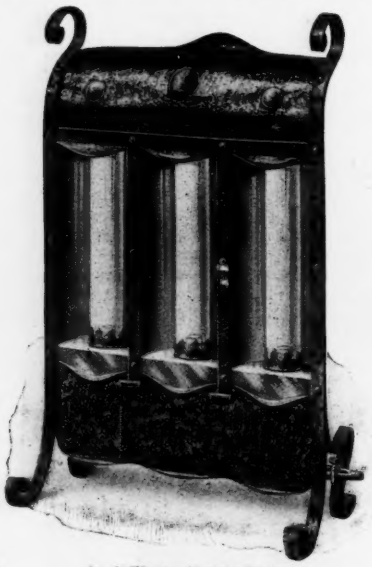
these interesting relics, attention is diverted to the samples of some of the modern productions of the Company. Here we have a test gasholder of 11 cubic feet capacity, an 8-inch station governor, a small exhibition model of a station meter, a 5000 cubic feet per hour round station meter with cradle, a 2000 cubic feet per hour station meter with feet cast on, a variety of dry meters from 1 to 500 lights (some in glass cases), a 3-inch unvarying water line meter, and cast-iron case wet meters. Reminder

is given by a 3-light Valon patent stop meter of the controversy in the "JOURNAL" some years over "Stops—not Slots." There are also shown slot meters in glass cases. Among the miscellaneous exhibits are a King's gauge, pressure register, Thomas' gauges, T, main, and locking cocks, unions, &c. The Company have adopted a novel method of calling special attention to their stand. The front of their office consists of a replica of a 30,000 cubic feet per hour square station meter; so that it is pretty certain their display will not be missed.

Messrs. John Wright and Co., Limited.

Considering that Messrs. John Wright and Co. have now over 1,000,000 of their "Eureka" cookers in daily use, it is not surprising to find at their interesting stand a large and varied display of these stoves. The "New Century Eureka" is one of the most modern cookers on the market; the oven lined inside and out with enamelled steel sheets, and packed with some patent non-conducting material, which retains the heat, and so saves gas. It is remarked that all inside fittings come out for cleaning, and the hot-plate being hinged lifts up, but when shut down, locks all the burners and other loose parts in position. Moreover, where specially ordered, all the burners can be fitted with separate gas and air adjusters. The "Slot" cooker business has, during the last few years, largely increased; and there is no doubt that the "Slot" cookers, both lined and unlined, to be found at this stand will receive careful inspection. An outstanding feature in Messrs. Wright's "Slot" cookers is the absolute interchangeability of all the parts. Other cookers of various types and patterns help in making up this interesting section of Messrs. Wright's manufactures, but special mention might be made of the "Colonial" cooker. We are informed that one of the principals of the firm specially visited the Colonies, with the object of obtaining the necessary information which would enable them to manufacture a cooker answering the peculiar requirements of the Colonies. The cooker is constructed on the lines of the "New Century Eureka," but has a larger hot-plate, with an extra number of boiling-burners, and a large griller for chops, steaks, &c.

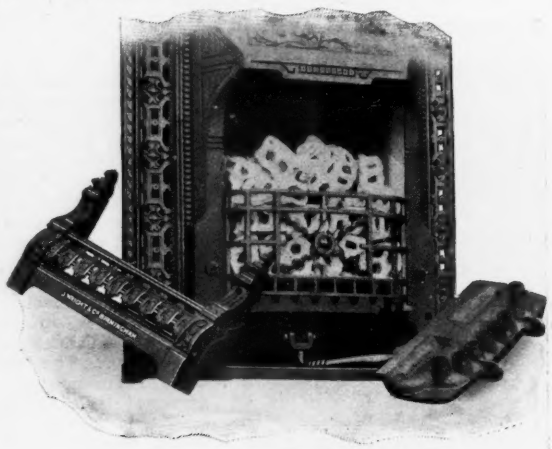
There are also noticed two novel gas-grillers—the "Comet,"



he "Electra" Gas Radiator.

being specially adapted for use with prepayment meters, and fitted with lifting top and hinged door, and the "Tudor" with automatic opening and closing of the doors. An excellent display of gas-heated steam radiators, finished in various colours, is also on view. Inspection will show they are very simple, both in construction and working. They dispense with any costly or elaborate system of piping, and can be placed in any position in either room or hall, &c., as only a gas-pipe connection to the radiator is necessary. A small quantity of water is put into the radiator; and when this is heated to boiling-point, by the gas-burner underneath, steam is generated, which causes the loops to become heated to a temperature of 216° Fahr. The economy of gas in these radiators arises from the fact that when the radiator has reached the above temperature, the automatic gas-valve will reduce the supply to just sufficient to maintain the radiator at this heat.

A highly interesting exhibit is the firm's automatic high-pressure boiler, which, owing to its unique adaptability in every class of building, is becoming more familiar every year. The apparatus can be connected, when required, to the existing hot-water circulation in connection with any coal range, and employed for delivering hot water all over a building. Each boiler is fitted with a heat-regulator, which automatically regulates the supply of gas as the temperature of the water varies from the desired limit. When hot water is drawn off, the inflow of cold water to replace it acts on this valve, which at once increases the gas supply, and brings the water to the desired temperature again; but, of course, as soon as the temperature is reached, the gas supply is then again reduced. The 20 gallons of water at 150° Fahr. contained in the boiler is sufficient for two baths; and we learn that boilers having a greater capacity for holding water are now procurable—such as 30, 40, and 60 gallons.



Cleaning without Disconnecting.

Turning to their "Eureka" gas-fires, they are excellent specimens of British manufacture. The porcelain enamelled, electro-bronzed, and electro-brassed finished fires will undoubtedly attract a large amount of notice. Wright's "Wizard" Slot Fire should enjoy special mention, as, although a full-sized stove and of artistic design, it is listed at a low price. The "Junior" gas-fire, which has a fire width of 8 inches, and gives a good bright fire with a gas consumption of only 12 feet per hour, is also economical in first cost. On a former occasion, we dealt fully with the "Simplex" adjustable gas-burner, and special brick and fuel arrangement which was last season fitted to most of the "Eureka" gas-fires. By this means, both the gas and air supply can be controlled under all conditions. The "Electra" gas-fires will attract special attention. They have the merits of being artistic, economical in use, and cheap in price.

Messrs. S. Cutler and Sons.

It is manifestly impossible to exhibit actual examples in the class of constructions in which this firm engage; but they have brought together a most interesting collection of photographs, excellently mounted, which indicate their many activities both in the gas industry and in general engineering. Although Ireland cannot claim one of the 8 million or even one of the 5 million cubic feet gasholders which the firm illustrate, it is noticed that Messrs. Cutler are able to instance among their contracts the largest gasholder in Dublin, which, being over 200 feet in diameter and of 2½ million cubic feet capacity, is of no inconsiderable proportions. Carburetted water-gas plant also receives prominent notice; and in minor matters, the Jäger system of deep filling for purifiers is not forgotten. Messrs. Cutler have included many examples of general engineering works carried out by them—such as large span roofs, steel buildings, bridge work, grain hoppers, and refrigerating machinery. There is also noticed an application of the "Charles Hunt" patent gas-washer to a recovery plant for the coke-ovens of a large steel-works in connection with some of the water-tube condensers of which the firm are makers. Photographs are also shown of pneumatic rivetting machinery in use for the field erection of large steel tanks, &c. Altogether the exhibit is excellent; and Messrs. Cutler are fortunate in having such an ample record of important constructive works from which to make a selection.

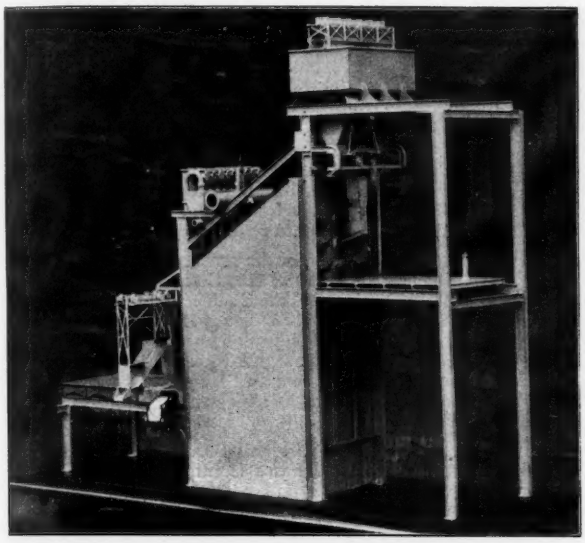
Messrs. Clayton, Son, and Co., Limited.

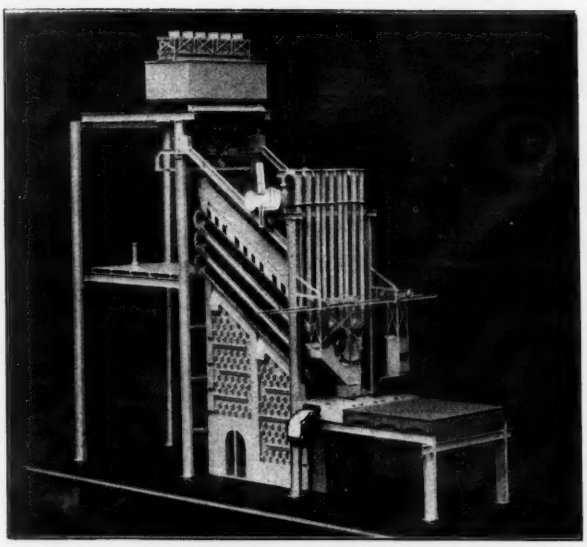
In gas-works, the above firm have a world-wide reputation, and of this we are reminded by the range of photographs at their stand, illustrating examples of the important contracts they have carried out at home and abroad—including gasholders, tanks, roofs, and general structural work. Messrs. Clayton, Son, and Co., Limited, of Moor End, Leeds, it will be observed are also the firm of similar name, of Pepper Road, Leeds, exhibiting welded steel pipes and bends; are also the Deighton Patent Flue and Tube Company, Limited, exhibiting corrugated flues; and are further the Yorkshire Patent Steam-Waggon Company, showing a 5-ton patent steam-waggon, suitable for use in gas-works.

Messrs. Graham, Morton, and Co.

Messrs. Graham, Morton, and Co., of Leeds, are ever thorough and original. Here on their stand we have a marvellous model—marvellous in its completeness and beautiful workmanship—of a complete section of the latest successful system of carbonization in gas-works by means of inclined retorts. The model is about 5 feet high and 6 feet long; and in depth is proportionate to the width of one setting of retorts. The complete section of the furnace is shown, and coloured to represent fire-brick work, as well as the whole of the steel joist structure, the coal-hoppers, measuring-chambers, Herring's patent hydraulic apparatus for opening the slide-valves in place of the cumbersome levers as

adopted in many installations, coal-charging shoots, Graham's improved coke drawing shoot (whereby the coke can be delivered on to the hot-coke conveyor, or down separate shoots in the event of the hot-coke conveyor not being used), hot-coke conveyor, and apparatus for charging the furnaces. The mouthpiece fittings the hydraulic and foul mains, &c., are all incorporated to give the model a finished air. The model is certainly one of the best that





Graham, Morton, and Co.'s Model of an Inclined Retort-Bench.

has ever been exhibited in connection with this class of plant; and the firm deserve every success for the trouble and expense gone to in giving such an elaborate exposition of their specialty work in carbonizing. The stall is rendered further interesting by a series of large photographs showing the magnitude of the work carried out by the firm in connection with retort-house work and elevating and conveying machinery.

Stewarts and Lloyds, Limited.

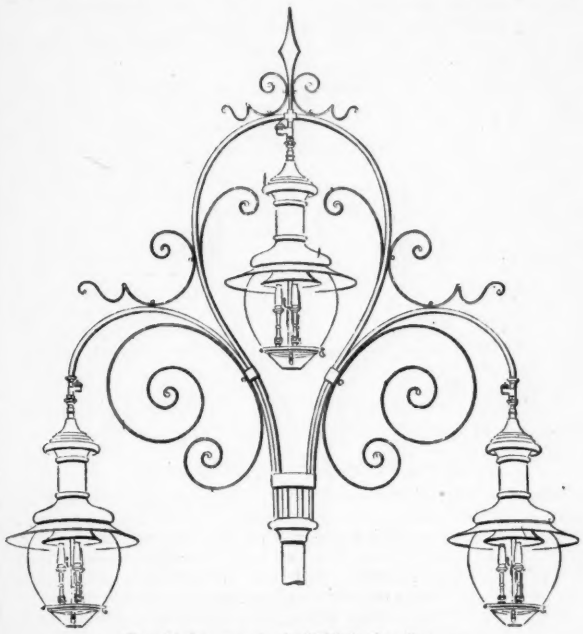
This firm will be showing an extensive range of their pipes and tubes.

OUTDOOR LIGHTING AND IN MACHINERY HALL.

Messrs. William Sugg and Co, Limited.

The exhibition of high-pressure gas lighting which Messrs. William Sugg and Co., Limited, are making is extensive, and it will embody their latest experiences in realizing a high duty under this system of illumination. The firm have undertaken the lighting of the centre and right-hand side of the entrance road to the Exhibition, from Morehampton Road, the front of the Palace of Mechanical Arts, and round the bandstand.

The disposition of the lamps is as follows: In front of the Palace of Mechanical Arts, nineteen wrought-iron tube columns, with ornamental cast-iron bases, each surmounted with an ornamental wrought-iron swan-neck and one 1500-candle power Sugg's "Belgravia" gas-lamp. On the right-hand side of the entrance road, there are ten wrought-iron tube columns, with ornamental cast-iron bases, each surmounted by an ornamental wrought-iron harp, and one 1500-candle power "Belgravia" gas-lamp. At the Morehampton Road entrance and down the centre of the road are eleven wrought-iron tube columns, with ornamental cast-iron bases, each surmounted with an ornamental wrought-iron fitment, carrying three 1500-candle power "Belgravia" gas-lamps. Round the bandstand are four wrought-iron tube columns, with ornamental cast-iron bases, each surmounted with an ornamental wrought-iron fitment, carrying five 1500-candle-power "Belgravia" lamps. The lamps are arranged so that the distance from the centre of the mantles to the ground-line is 16 feet (with the exception of the centre lamps of the clusters). In all, there are 94 lamps of 1500-candle power, giving the magnificent aggregate illuminating power of 141,000 candles.



Sugg's Arrangement of Triple Gas-Lamp.

The lamps used, as mentioned, are of Sugg's patent "Belgravia" pattern; each being fitted with three 500-candle power high-pressure burners. These are arranged so as to light up instantaneously from one point; each lamp being fitted with Sugg's patent mercurial seal, by means of which the gas services are kept fully charged when the gas is turned off from a distance. By this means when the main cock is again turned on, the burners light up instantaneously; thus obviating the risk of the flash-lights being extinguished by a rush of air from the pipes.

The pressure of the gas is raised to give 16 inches (column of water) under the burners, at which the highest results are being obtained. The pressure-increasers employed are two of Sugg's patent No. 6 size direct-action gas-engine pressure increasers, each of which consists of a gas-engine and pressure-increaser upon cast-iron base, with gas container and governor, and the usual accessories for the engine. Either of the pressure-increasers separately would be capable of dealing with the full requirements on occasion.

Messrs. James Keith & Blackman Co., Ltd.

This Company are also making a prominent display of high-pressure lighting. They are lighting one side of the Main Avenue —*i.e.*, the path that runs along the side of the Gas Pavilion, two sides of the Grand Central Palace, and the Gardens in between the Palace Restaurant and the Tea Pavilion and the Palace of Industries and the Grand Central Palace. There are also eight lamps in the Grand Central Palace itself.

In all, the firm are supplying 114 lamps, each of 1500-candle power, divided as follows: 75 columns, each carrying a swan-neck bracket and one lamp, 10 columns, carrying harps with one lamp, and 7 columns carrying clusters of three lamps—the centre one arranged in a harp, and two suspended from swan-necks all in one line.

The compressing plant is supplied in duplicate, and is fixed in the Gas Pavilion. The plant consists of two compressors, each capable of supplying the full quantity of gas required. They are belt-driven by means of small gas-engines, also in duplicate. The compressors are of special design on the rotary positive blower principle. These blowers are mounted on cast-iron bases, which contain the gas ports and the control and gas-pressure regulating-valves. The valves of this type enable the firm to dispense with their general pattern of regulating holder, governing the gas to a regular pressure, and returning all gas that is not required for the burners automatically to the inlet. The pressure as it leaves the blowers will be regulated to about 20 inches.

The lighting and extinguishing of the lamps is controlled from the compressors. This is arranged by double piping—one pipe supplying the high-pressure direct from the blowers, and the

second pipe taking gas at the normal pressure. The latter is for the use of bye-passes only, so that they remain constant throughout the day and night. In the cast-iron head of each column, a mercurial seal is arranged to prevent the mains exhausting themselves of gas, and filling with air, when the compressors are not in use. The floats of the seal operate at 2 inches; and the pressure of gas at the burning point is from 16 to 17 inches.

Each compressor is fitted up independently, and arranged with a bye-pass; so that, when the high-pressure gas is not required, the compressor inlet and outlet can be closed, and low-pressure gas supplied to the high-pressure main, to keep it charged. The operation of lighting—of course assuming that at least one compressor is running—will be to close the low-pressure gas from the high-pressure main, and open the inlet and outlet of the compressor. The pressure coming on to the main will lift the float in the seal on the top of the head, and give the burners their full supply of gas—they being ignited by the constant pilot-light. To extinguish the light, the operation is merely to close the outlet on the compressor, or stop its working.

This method of controlling the lamps may be looked upon by some as expensive, owing to the double piping; but it will be recognized that the system is one that dispenses with all delicate apparatus which is likely to get out of order, and puts the lighting and extinguishing control on a reliable basis. As the piping for the gas supply has to be specially run, the running of a second pipe for the pilot-light is not a serious expense.

The lamps are of the firm's standard pattern (No. 43); and they permit of the air supply to the burners being adjusted from the outside of the globe while the burners are in use. The lamps are fixed without any cock; but the rising-mains in the column standards are fitted with control cocks, so that any individual lamp can be shut off. Each lamp contains three 500-candle power burners, each arranged to pass 16 cubic feet per hour at 16 inches pressure. The globes in use are made of special heat-resisting quality.

The hourly gas consumption for the whole installation will be 5700 cubic feet, giving an illumination of 171,000 candles.

Messrs. Anderson and Duffield, Limited.

The "Dacolight" system of high-pressure gas lighting has been selected for the illuminating of one section of the Machinery Hall. The apparatus for raising the gas to the required pressure of 12 inches is located in the place set apart for "Gas-Compressing Plant" in the Gas Pavilion; and it is in duplicate. It consists of a pair of 1¼ horse-power gas-engines, having magneto ignition, and directly driving rotary pressure-raisers of the positive type, each capable of dealing with 3500 cubic feet of gas per hour. These discharge the gas into a pressure holder, from which it passes into the high-pressure main, and to the lamps. Between the two sets of pressure-raisers is placed a relief valve of the diaphragm type, which is accurately adjusted to automatically open if the pressure on the holder side of the apparatus should exceed the pre-arranged limit; and the gas thus bye-passed is re-admitted at the inlet. On one side of the apparatus is fixed an automatic bye-pass valve also of the diaphragm type. This valve is kept closed by the high-pressure gas when the engines are running, but immediately opens full way when they are stopped—thus allowing gas to pass direct from the low-pressure main to the high-pressure one. Consequently, the building cannot be left in darkness should the engines stop, or be stopped. The pressure holder, as well as the automatic relief valves are common to both sets of pressure-raisers.

One of the most important features in this installation is that the gas-engines are fitted with magneto ignition, instead of the bunsen burner ignition tube. The engines are thus always ready for starting at a moment's notice; and in the case of a duplicate plant there is no bunsen to be always kept alight. Therefore, as there are no bunsen burners or ignition tubes, there is no cost for gas or renewals in this connection, no trouble or delay from broken tubes, and no special knowledge required in starting the engine.

Another feature here is that the pressure-raiser, being of the rotary type, there are no valves to get out of order.

In the Machinery Hall are fixed 63 large "Arc" pattern lamps, each giving an illuminating effect of 1500 candles. A separate supply is run from the low-pressure main to the flash lights; and the lamps have at top specially-protected mercurial seal fittings, arranged so that, immediately upon the engine being started, the whole of the lamps will light up instantaneously.

The Young and Glover Vertical Retorts.

The St. Helens Corporation Gas and Lighting Committee have been considering a report of their Engineer, Mr. Samuel Glover, on the subject of extensions of the gas-works; and they have decided to accept the tender of the West's Gas Improvement Company, Limited, for a complete installation of the Young and Glover patent continuous vertical retorts, with the necessary coal-handling machinery, coal-bunkers, and mechanical arrangements for the continuous working of the retorts. By the introduction of these retorts, it is intended to increase the output of gas from the old works, which has been equivalent to an increase of 5·4 per cent. for the financial year ending the 31st of March last. It is anticipated that the retorts will be put into operation during the coming autumn.

PERSONAL.

There were 130 applicants for the vacant position of Manager of the Seaford Gas-Works; and we learn that Mr. L. D. Mosley, Assistant to Mr. H. Kendrick, of Stretford, has been unanimously selected by the Directors to fill it.

Mr. George Bruce, the Assistant-Manager at Alexandria, N.B., has been appointed Manager of the Holytown Gas Company, in succession to Mr. Gavin Smellie, resigned. Mr. Bruce came from Banffshire about two years ago. There were 43 applicants for the post.

The Devonport Gas Committee received 180 applications for the position of Outdoor Superintendent which was advertised in the "Journal" in March. Five of these were selected by the Committee, and were visited and interviewed by the Chairman (Alderman W. Hornbrook) and the Gas Engineer and Manager (Mr. J. W. Buckley). As the result of their report, the Gas Committee selected Mr. H. Clarke, of Luton; and the Town Council will be asked at the next meeting to confirm his appointment.

It will be seen, from the report of the proceedings at the annual meeting of the Buenos Ayres (New) Gas Company last Wednesday, given in another column, that the Chairman announced, with an expression of the regret of the Board, that Mr. James Dougall, the Company's Engineer, had been compelled to resign, on account of the climate being unsuitable to him. Mr. Dougall, it may be remembered, was Engineer and Manager of the Isle of Thanet Gas Company, Margate, before going to Buenos Ayres about three years ago.

Some of our readers may recollect that the Midland Railway Company a short time ago decided to discontinue the manufacture of gas at their works at Derby, and take their supply from the Derby Gas Company. The works were in charge of Mr. Henry Fowler, whose name will doubtless be remembered in connection with his membership of the Midland Association of Gas Managers and his papers which have been published in the "Journal"—notably the one on "The Lighting of Railway Premises," read before the Institution of Mechanical Engineers towards the close of last year. As his services will no longer be required for the production of gas, the Company have appointed him Locomotive Works Manager.

There have recently been a number of changes in the manufacturing staff of the Gaslight and Coke Company—centring round Mr. Frederick Beale's retirement from the position of Engineer at the Nine Elms station. Mr. T. S. Lacey from Bromley succeeds Mr. Beale at Nine Elms; and Mr. R. Birkett, Assistant to Mr. J. N. Reeson at Beckton, goes to be Chief in succession to Mr. Lacey. Mr. M'Minn from Shoreditch is made Assistant at Fulham, in consequence of Mr. Soloman being transferred from Fulham to Beckton. Mr. Wilton from Nine Elms is transferred to Beckton; while Mr. John Hornby from Beckton takes Mr. Wilton's position at Nine Elms. Beyond this, Mr. Clarry moves from Beckton to be Assistant at the Shoreditch station.

From the applications received by the Gas and Water Committee of the Ramsgate Corporation for the position of Engineer and Manager, rendered vacant by the resignation of Mr. T. N. Ritson, Assoc.M.Inst.C.E., they selected four candidates for personal interview. The result has been the appointment of Mr. William Thomson, the Gas, Electricity, and Water Engineer to the Kendal Corporation. Mr. Thomson served his articles in the Engineering Department of the Highland Railway Company; and on the completion of his term he spent a considerable time in the workshops of Messrs. Alder and Mackay, of Edinburgh, where he acquired a knowledge of the construction and testing of prepayment meters. He was afterwards appointed Assistant-Engineer and Manager, under his father, at the Inverness Gas-Works—a position he held for three years. Early in 1899, he became Chief Assistant and Deputy Engineer and Manager, under Mr. George R. Hislop, at the Paisley Gas-Works, where his duties comprised practically the absolute control of the works and men. In September, 1902, he was selected to succeed Mr. Ritson at Kendal, on the removal of this gentleman to Ramsgate; and he has fully sustained there his credentials as a thoroughly qualified Engineer and Manager, having, by close personal supervision in all the departments, and by economies effected by judicious foresight in arranging work and men, increased the surplus profits, and enabled the Committee to reduce the price of gas.

At the recent quarterly meeting of the Executive Council of the Urban District Councils Association, a letter was received from the Felixstowe Urban District Council suggesting that the Association should represent to the proper authorities that the laws regulating the quality of gas out of London require alteration in favour of the consumer, and also providing for the testing being practically unrestricted, and the abolition of the preliminary notice in respect thereto. The suggestions contained in the letter were approved, and the Secretary was instructed to make recommendations thereon to the Board of Trade and the Local Government Board. Letters were also received from the Winsford and Watford Urban District Councils, suggesting that the Association should take the opinion of some eminent Counsel upon the question of the payment of income-tax on the domestic water-rate; and this course was agreed to.

ILLUMINATING TRUTHS FOR HOUSEHOLDERS.

(3)

FIRE RISKS.

NEGLIGENCE is the cause of the majority of the explosions and fires produced by gas; and there is really no excuse for that negligence. Gas has an unmistakable smell about it; and if there is a leakage—however trifling—every nose that can fulfil its proper functions, on entering the room in which the escape happens to be, must detect it. The smell of gas denotes the existence of a faulty tap, or perhaps a damaged pipe or joint; and the warning having been given, immediate steps should be taken to find out—not by the foolish and hazardous method of applying a match or light—the seat of the fault, and have it corrected by a qualified man from the local gas suppliers' office, or a competent neighbouring fitter. The exercise of a little caution and the avoiding of negligence would prevent much trouble where gas is concerned; and therefore it is upon the want of caution and the inexcusable negligence, and not upon gas, that the responsibility for the greater part of the trouble that does arise should rest. Gas through its smell warns consumers of danger. Electricity has its dangers, but it issues no warning. It works, as will be shown, insidiously; and trouble—often serious trouble—is upon the user before he is aware of it.

The electrician tells the householder that his commodity is safer than gas. This it is easy to controvert by facts—facts that will show (even making no allowance for the truth that to carelessness is traceable most of the unfortunate occurrences with gas) that gas is accountable for fewer fires than electricity, having regard to the relative number of consumers.

Stringent Rules for Electrical Installations.

The signal which, through the organ of smell, gas gives of danger when there is an escape, is a great factor in safety. With electricity one does not know when or where there may be trouble—moderate or disastrous in kind. The Phœnix Fire Office has a long set of rules, the Institution of Electrical Engineers have over a hundred rules, some of which have sub-provisions lettered well into the alphabet, the Liverpool and London and Globe, and other Fire Offices have adopted the Institution or the Phœnix rules, and have supplementary ones for special risks, the Board of Trade have also issued regulations, and the London County Council have regulations referring to theatres and other licensed buildings—all applying to the installation of electricity in premises for lighting and power purposes, with the view of minimizing the risks introduced by electricity. The rules affect every part of an installation, from the meter to the point of use. What does all this governing imply—Danger; and danger in every conceivable part of the installation. Such minute regulation and governing of gas installations is not known, and is unnecessary; but let there be in any one of the numerous small particulars negligence or oversight in complying with the rigorous regulations laid down for electrical installation, and where there is that negligence or oversight, there is the seat of an unknown and unsuspected danger. Even where any set of rules are fully complied with, there is no guarantee that something will not go wrong, and occasion disaster. It cannot be admitted, however, that fires that have had their origin in electric light fittings, having regard to the importance of many of the places in which those fires have occurred, have all been due to imperfect installation. At an inquiry into a fire that occurred on the premises of Messrs. Saqui and Lawrence, at No. 63, St. Paul's Churchyard, on April 13, it was given in evidence, by an Inspector of the City of London Electric Light Company, that "the electric lighting installation had passed a very satisfactory test." Notwithstanding, Engineer Sibley, of the Fire Brigade, stated that he had come to the conclusion that there had been a short-circuit or a fusion of the wires. Mr. Saqui was of the same opinion; and this witness also stated that in 1903, when an official of the Electric Lighting Company was inspecting a meter on the premises, there was a short-circuit which did some damage, and the Company made the damage good. Other witnesses and the jury were of opinion that the fire, concerning which inquiry was being made, was due to celluloid goods being in close proximity to the electric lamps or wires. But it may be supposed that those celluloid goods were not there for the first time on the day of the fire.

There is one thing that should be made perfectly clear here. It is not for the want of endeavour—the abundance of the rules governing installations show it—that electricians have not succeeded in making their work so perfect that they can guarantee the user of electricity against fire. But it must be shown, as electricity is, in the competition for business, described in the advertising literature of electricity suppliers as the safest illuminant, that its innocence is far from being of the purity painted.

The Danger of Electricity Long Appreciated.

The appreciation of the danger of electricity in generating fires is no new thing. In "THE TIMES" for Jan. 28, 1904, there was an article referring to the loss Italy sustained by the fire at the National Library at Turin; the fire having been caused by electrical fusion. In the course of the article, these remarks were made:—

> As to the electric light . . . . we confess that we admire and approve the fixed determination of the Trustees of the National Gallery to have nothing to do with it. The light is so new, and its liability to cause danger so great, and as yet so imperfectly understood by ordinary workmen and attendants, that very special care on the part of a thoroughly competent person is of the first necessity. Perhaps the warning is even more required by the thousands of ignorant householders who during the last ten years have had their dwellings fitted with the light; but it is with the public buildings all over the country that we are immediately and for the moment concerned.

The "DAILY TELEGRAPH," too, on Jan. 28, 1905, made the following warning observations:—

> Electricity is a useful servant; but it is also one which requires close watching, in the sense that it is a fruitful source of fires. During the past few months, a large and quite disproportionate number of country houses—some of them of considerable historic interest—have been burned to the ground; and in many instances the outbreak has been traced to fused electric wire or defective insulation, a danger against which it seems difficult to take absolutely sure precautions. So at Eton yesterday a fire took place in one of the masters' houses which was apparently due to this cause.

The appreciation of the danger by these two leading daily papers in 1904 and 1905 reflects in only a small degree the recognition of the danger to-day.

The Testimony of London Statistics.

It has been pointed out that, after all the elaborate rules and regulations that have been framed for preventing fires by electricity installations, there is no guarantee of freedom from them. The available statistics confirm this.

Turn to the annual report of the CHIEF OFFICER of the LONDON FIRE BRIGADE for 1906. He states that 105 of the fires in the Metropolis in the year were due to electricity, and 405 to gas lighting and heating. The figures taken in their nakedness look very favourable to electricity; but when properly examined, they are extremely favourable to gas. Some of the electricity suppliers in London are a little modest, and do not make returns as to the number of consumers they possess; but, from the statistics available, a generous estimate of the number of electricity consumers supplied by the 31 electricity undertakings in London is (using a round figure) 80,000. Within a smaller area, the three London Gas Companies alone supply nearly 900,000 consumers, among whom there are in use upwards of 600,000 hired gas-stoves and fires (saying nothing about those that are private possessions). Leaving the number of stoves out of consideration, and dealing only with consumers, the fact is arrived at that *the electrical fires in 1906 averaged one to (say) every 760 electricity consumers, and the gas-fires one to every 2220 gas consumers.* To gas the injustice is being done here of not including those consumers who are in the suburban gas companies' areas covered by the electricity statistics as to consumers; nor is credit taken, in considering the comparatively small number of fires due to gas, for the 600,000 hired stoves, nor for the myriads of points of gas use for lighting, power, and other domestic and industrial purposes in the Metropolis. It is noticed, too, that a large proportion of the fires due to gas was owing to sheer carelessness. For instance, "Curtains or window blinds coming in contact with gas-flames" account for no less than one-fourth of the total, or 102; and "Other goods coming into contact with gas-lights" account for another 17. The figures in the report do not take account of the small fires originated by electrical installations which do damage, but are subdued without the intervention of the Fire Brigade.

Lieut. SLADEN, one of the Divisional Officers of the London Fire Brigade, states that, whereas five years ago there were only 20 fires due to electric wires, in 1906 there were over 150.

Suspicious Fires.

Dr. WALDO, the City Coroner, gives it as his opinion that more fires are due to electricity than come to light. He has heard, and has known, of some very suspicious cases in which electric wires are concerned.

Concealment is an advantage (from the point of view of electricity, but not from that of the user) that electricity has in partially protecting its character. A fire may be started at some point where the wires are not visible; the combustible insulation of the wires will serve as a good conductor of fire through a house; and in many fires that cannot be accounted for, all trace of whether or not electricity has had part in producing the disaster is completely effaced by the fire. [Gas cannot burn without air to support combustion, so that the gas-piping of a house cannot serve as a conductor of fire.] Fires the origin of which cannot be traced appear to be growing more frequent; and there must be agreement with the Coroner for the City of London, that there is more need now than ever that non-fatal as well as fatal fires should be closely investigated.

Fuses not a Certain Protection.

There is a word to say about the prevalent idea that fuses are a great safeguard against fires occurring through any fault in an electric installation. This is not right; and "ELECTRICITY AND ELECTRICAL ENGINEERING" owns up to it. Within a certain range of contingencies, fuses are certainly safeguards, and are obviously indispensable; for instance, against the overloading of leads and against short-circuits. But the paper named candidly says they are not a protection against all chances of fire. Some of the most insidious of faults can still do damage, and yet, possibly, not blow the fuse, either at all or too late. These are in regard to bad connections. And one of the most usual places where such

faults occur, especially where the wiring and fitting have been carried out in a slipshod manner, is in connection with the switch-wires.

Constant Precaution.

The great precaution necessary in dealing with electricity is not confined to the making of the installation; it must be carried on throughout the period of use.

For instance, in December 1906, a letter appeared in the "Glasgow Herald," in which the correspondents called attention to the grave risks incurred by shopkeepers, managers, and others entrusted with the responsibility of turning the electric current off at the main switch on closing up. "Not a few disastrous fires," said the writers, "have occurred from neglect to turn the current off at the main. The troubles such a catastrophe brings in its train are known only to the sufferers. The safety of the whole community depends far more on this precaution than it is aware of."

Examples of Fires.

A few of the fires reported in the Daily Press, in which electricity has been concerned, may be quoted as examples.

Italy suffered greatly in 1906 by the destruction of the Italian and Hungarian Decorative Art Sections of the Milan Exhibition, and by injury to other sections—the estimated loss reaching about £160,000. The reports that reached this country were to the effect that the "outbreak was due to the fusing of an electric lighting wire;" and there "was no ground for any suspicion of incendiarism."

On July 18, 1906, there was a big fire at an extensive drapery establishment in South London, and damage computed at £30,000 was done. The newspapers stated that something went amiss with the electricity supply, and the "resulting fusing" set fire to quantities of hanging lace and light goods. One of the electrical papers explained that the flexible cord of a hanging electric lamp caught fire, and communicated the fire to some inflammable material near by.

In February, 1907, there was an extensive fire in Wood Street, E.C.; the damage being estimated at £80,000. This is the biggest fire in the City since the Barbican outbreak in May, 1902. There have been some decent sized ones in the interim; and Dr. Waldo (the City Coroner) says that insurance rates for such warehouses as those in Wood Street have, consequently, gone up tremendously. The first information about the Wood Street fire was that a Mr. Baker noticed "a dull red light" through a frosted glass door on the second floor of No. 12, Wood Street. But a porter declared that he left the office in question in perfect order, a few minutes after his employer had quitted it; and he also mentioned that a few years ago there was a "short-circuit fire, which was caused, so it was suggested, by a live wire touching the telephone wire during the installation of an electric radiator." This was one of the occasions on which Dr. Waldo made the statement that he had heard, and had known, of some very suspicious cases in which electric wires were concerned. While the jury returned a verdict to the effect that the fire was caused by some means unknown, they also recommended that all electric wires should be encased in metal tubes.

On April 13, 1907, Camden Church, Camberwell, was seen to be in flames; and before the fire could be subdued, considerable damage was done to the interior. The fire was stated to be due to a wire fusing in the vicinity of the choir organ. The new organ, erected at a cost of about £1500, was almost completely destroyed.

Said "THE GLOBE" on April 9, 1907: The Earl of Shrewsbury and Talbot's London residence, at the corner of George and Maddox Streets, W., was the scene of a slight fire last night. The household were able to extinguish the flames without the help of the Fire Brigade; but it is understood that considerable damage was done to one of the chief apartments. The fusing of the electric light wires is said to have been the direct cause of the outbreak; the flames setting some hangings ablaze.

It would be easy to multiply these instances very considerably; but the examples suffice. They confirm the danger, the necessity for comprehensive regulation, and the apprehension as to many fires being caused by electricity that, after the catastrophe, cannot be brought home to it through the effectual wiping out of the evidence; and they show the havoc that electricity can occasion.

Then Which is the Safer Light?

The householder is now asked to judge—having regard to the large amount of regulation and instruction that must attend the fitting up of premises for electric lighting, having regard to the proved insidiousness of electricity in generating fires, having regard to the experiences of recent years, and giving to both gas and electricity the right to care in use—whether the claims of the electricians to the safest light are substantiated. The answer of those who carefully read the information contained in this article, will, it is believed with confidence, be in the negative.

Institution of Civil Engineers.—At the annual general meeting of the Institution last Tuesday, the result of the ballot for the election of officers for the ensuing year was declared. The new President is Sir William Matthews, K.C.M.G.; the Vice-Presidents are Mr. W. R. Galbraith, Sir E. Leader Williams, Mr. J. C. Inglis, and Mr. G. H. Hill; and among the Members of Council are Colonel R. E. B. Crompton, C.B., Dr. G. F. Deacon, Mr. Maurice Fitzmaurice, C.M.G., Mr. Walter Hunter, Sir George Livesey, Mr. Alex. Siemens, and Professor W. C. Unwin. The new Council will take office next November. Among the awards made by the Council for papers read and discussed before the Institution during the past session is a Telford Gold Medal to Mr. Dugald Clerk.

VALUATION OF GAS OILS.

AMONG the communications made at the meeting of the Society of Public Analysts at the rooms of the Chemical Society in Burlington House on Wednesday last, was a paper by Messrs. Raymond Ross, F.I.C., and J. P. Leather, of Burnley, entitled "A Further Communication on the Valuation of Oils used for Gas-Making Purposes." The paper was said to be too long and too detailed for reading *in extenso;* but Mr. Raymond Ross stated briefly the chief points dealt with in it. He referred to the method of valuing gas oils which the authors had described in an earlier paper before the Society,* and then to the alternative method recently suggested by Dr. A. Spiegel.†

The authors had compared the values arrived at by the two methods for a very large number of oils, and the results showed that Dr. Spiegel's method in many instances gave values widely differing from theirs. As the authors' method gave results which agreed substantially with those obtained from the oils in practical use in a carburetted water-gas plant, it was reasonable to infer that Dr. Spiegel's proposal to value the oils by reference to their ultimate analysis was not generally applicable. The following figures were quoted in illustration of the authors' contention:—

Valuation of Oils.

American Gas Oil = 100.

Source of Oil.	Carbon.	Hydrogen.	Spiegel's Value.	Ross and Leather's Value.	Difference.
Burma	85·02	13·45	98·22	82·68	+ 15·6
Sumatra	84·79	14·25	107·90	98·43	+ 9·5
North America .	86·41	13·59	100·00	100·00	—
Borneo	87·58	11·71	77·16	50·58	+ 26·5
Russia	86·50	13·27	96·04	99·87	− 3·8
Grosny	85·71	12·62	88·22	85·99	+ 2·2
Texas	86·71	12·58	87·74	74·37	+ 13·3
German M_1 . .	86·66	13·01	95·24	95·05	+ 0·2
,, M_2 . .	85·03	12·26	83·86	84·58	− 0·7
,, H_3 . .	86·00	11·62	76·11	78·41	− 2·3
Paraffin (liquid).	85·72	13·92	105·90	113·30	− 7·4

It appears from these results that when Dr. Spiegel's proposal is tested by reference to oils of widely different origin, it fails to give satisfactory results—in many cases the values ascribed by his method to the oil differ greatly from the carbonization values. Mr. Ross pointed out that, although the degree of hydrogenation had some bearing on the value of oils, it was confined to those of similar class, and had not the great effect which Dr. Spiegel's mode of valuation ascribed to it. The class to which the oils belonged had far greater bearing on their value—in fact, Dr. Spiegel admitted that his proposed mode of valuation failed when hydrocarbons of the character of decahydronaphthalene were present. To Dr. Spiegel's criticism of Messrs. Ross and Leather's process of carbonizing—that it did not show the full effect of the polymethylenes or of homologues of methane in the gas—Mr. Raymond Ross replied that he had found only negligible quantities of the paraffins higher than methane in carburetted water gas, and that in an analysis of that gas no appreciable error was introduced if the residue remaining after absorption by fuming sulphuric acid was regarded as containing no hydrocarbon except methane. The calculation of the results of combustion of that residue could be safely made on the assumption that there were no homologues of methane present. He had failed to find appreciable quantities of other paraffins than methane when he had applied absolute alcohol for their absorption. It was possible that homologues of methane, however, would be found in carburetted water gas made at a very low temperature. The German oils referred to in the table were, of course, obtained by the distillation of the German brown coal or lignite.

There was very little discussion on the paper; but a few remarks, complimentary to the authors' work, were made by Messrs. Archbutt, W. J. Atkinson Butterfield, Julian L. Baker, and the President, Mr. John Clark, Ph.D. It is evident that profitable discussion of a paper of this nature cannot be hoped for unless the Society see their way to circulating proofs of the paper, or at least a digest of its contents, before or at the meeting. Failing this, such a paper should have been read in its entirety, and not merely hurriedly outlined in order that three other papers might also be "read" and discussed in the brief space of two hours. One of these papers, on the "Estimation of Lime and Magnesia in Water by Volumetric Methods," by Mr. W. T. Burgess, F.I.C., should prove very useful to those who have to make determinations of the hardness of water. As to Messrs. Ross and Leather's communication, we think it a pity that it was reserved for this Society, whose meetings are attended by few but their own members, only a very small number of whom have any practical experience of the examination of gas oils.

* See "JOURNAL," Vol. XCIV., p. 785, and Vol. XCV., p. 825.

† *Ibid.*, Vol. XCVII., p. 822.

It is said to be extremely important to the proper setting of concrete, if the best results are to be obtained, that it should be protected from the wind and sun while the process is going on, especially in dry, warm weather. The dry air will rob the sharp corners, and even the faces, of their moisture, and a later wetting will not repair the damage.

LOADING AND CONVEYING PLANTS FOR USE IN GAS-WORKS.

By G. Dieterich,

Engineer-in-Chief to Adolf Bleichert and Co., of Leipzig-Gohlis.

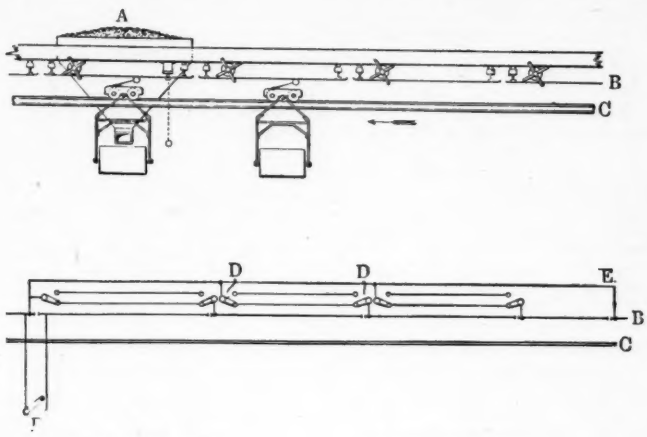
(*Continued from p.* 300.)

THE ELECTRIC SUSPENSION RAILWAY.

The two plants already described about represent the climax in the development of loading appliances with wire-rope driving, and plainly show the extreme technical possibilities of a transport system originally regarded by engineers as anything but perfect. It must not, however, be overlooked that the installations in Mariendorf and Tegel are both examples in which the introduction of large mechanical transport plants, for the attainment of the highest possible economy in labour, was part of the original scheme. Consequently, to a certain extent, the whole arrangement of the gas-works installation was carried out with a constant regard to the transport ways and the appliances for dealing with the same.

Here, again, is a record of economical success which could hardly have been obtained by any means or methods previously employed. Improved methods will, however, always supersede good ones; and, even in the present cases, the question arises if the arrangements hitherto described have so nearly reached the technical and economical ideal as is possible, more especially

Fig. 23.—Electric Suspension Railway.



A. Filling Hopper.
B. Transport Line.
C. Suspension Track.
D. Switches.
E. Return Line.
F. Unloading Station.

Fig. 25.—The Safety Arrangement for Crossings or Points.

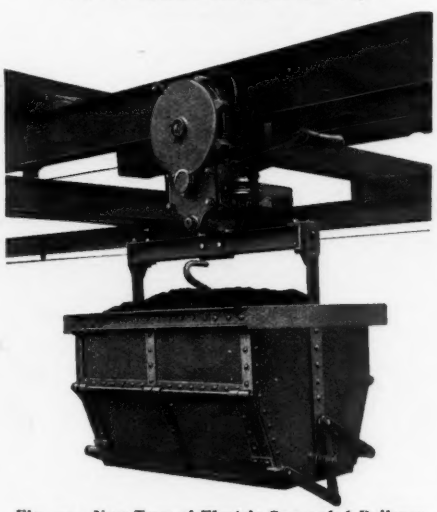
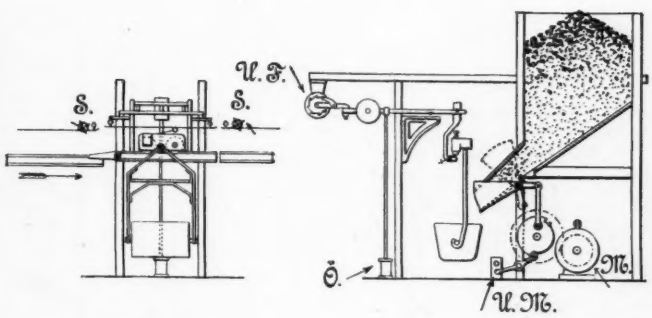


Fig. 24.—New Type of Electric Suspended Railway.



A. Switches.
B. Appliance for Stopping and Filling the Travelling Hopper.
C. Suspension Track.
D. Oil Container.
E. Switch to Control the Motor and the Coal-Hopper Doors.
F. Electric Motor.

Fig. 26.—Device for Automatically Loading Electrically-Driven Suspension Railway Cars.

with reference to adaptability to already existing plants, and not to such as have still to be erected. This question cannot be emphatically answered in the affirmative. As long as heavy and expensive steam-engines (locomotives) with trains attached, or traction ropes in continuous motion, were alone known as means of supplying motive force for moving car loads, the latter method certainly furnished the most perfect means for the transmission of power for traction purposes in gas-works. A traction rope, however, necessitates a comparatively simple location of the horizontal track. Even although curves or bends in any given direction have no influence on traction rope working, because a traction rope can be laid in all possible directions just as a fixed line, still branches necessitate special arrangements.

The running over points in various directions, the insertion of short sidings, the stopping and starting of the single cars on the track, all involve extensive installations; so that, with traction rope working, short, inserted sections run by hand must often be taken into consideration. And further, the traction rope on the horizontal sections—especially as the coupling points will follow one another in rapid succession—is subject to strain through curvature. Again, on the horizontal section the traction rope has only to effect the very minimum friction work, whereas on the inclined bridges it must be capable of very considerable hoisting work. Consequently, the technical ideal would be much nearer approached by a separation of hoisting and friction work in such installations.

With the introduction of small, independent electric motors, means were provided for erecting appliances which gave the separate loads absolute independence from power conductors of any description, branch lines, or hard labour, &c., and with which it was still possible to maintain uninterrupted traffic in every direction—an important factor from an economical point of view. First, permit me to make the reader familiar with the simplest of electrically driven suspension railways, which, in their present form, were also introduced into technical science by the firm Adolph Bleichert and Co., of Leipzig-Gohlis, and to whom we are also indebted for the definition "electric suspension railway."

As a matter of history, I must first remark that the idea of

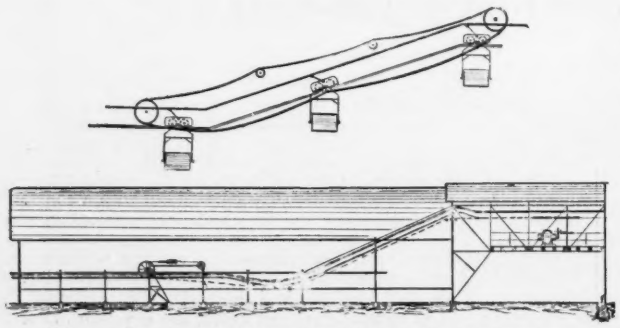


Fig. 27.—Combined Guided and Direct-Driving Electric Ropeway.

electrically driven suspension transport, and the first experiments connected therewith, date a long way back, and are almost coincident with the introduction of electric motor driving in the technics of railways. In the first place, the introduction of electromotors into technical railway science had the result that in fixed railways, the principle of an intermittent train service fell into disuse, and led to the introduction of single cars, running at short intervals of time, with a practically continuous traffic. This principle was adopted bodily for suspension railways, by providing each separate suspended car with a small electric motor, and thus despatching it on to the open track. American firms were the first to take the matter up; but the introduction of the system into important industrial branches was at first opposed by great difficulties. It was found so hard to break with the conditions created by mechanically driven plants, and it was thought possible to simply transfer the experience won with fixed railways to the suspension railways.

Here, again, we miss uniformity of system and that complete systematic study of the whole subject which, beginning theoretically, necessarily develops into those practical experiments which must be, and are always, the foundation of a whole system. In the first instance, the idea of employing a weighted and freely stretched rope as a track for the cars must be dropped, as it can never prove a success. In electric suspended railways, guided locomotion is entirely missing, or, in other words, as means of transferring power only the adhesion between wheel and rails comes into consideration, as is also the case with fixed railways. The next question of importance was to subordinate all traffic details to one single idea. Sidings, crossings, conductors, and safety fuses had only the one object of accommodating themselves to the single electrically-driven suspension car. It was also necessary to depart from the customary forms of switches, controllers, resisters, brakes, &c.—in fact, it was first necessary to consider the creation of a special type of motor, differing very considerably from the one hitherto in use. The question of the transmission of power, the lubrication, the cooling of the motors, and the possibility of carrying out repairs, had to be entirely reconsidered. In short, it required years of preliminary work and the collection and classification of the material scattered far and wide in the trades interested, but hardly to be found at all in technical literature, in order to arrive at a definite result.

Although the modern electric suspension railway appears to us in a comparatively simple form, and although many a technical expert may be tempted to say "the matter is awfully simple," it must still be remembered that this comparative simplicity has only been attained in a most roundabout manner, and after a thousand trials in the enormous region of technical science. The simplest form of the electric suspension railway, as shown in fig. 23, appears as a suspension railway of the known type, on one side of which a motor of special description is built. This motor draws its current from a running conductor stretched parallel to the suspension track, and which transfers its power, by means of a pinion, to one or both running wheels, the flanges of which are arranged as tooth flanges for this purpose. This description of electric suspension railway, in its various types, is everywhere sufficient where it is a question of driving by electricity on simple, level tracks, by means of aerial-way working; it requires no further explanation.

The tracks for such an electric suspension railway are formed of double-headed suspension rails of the well-known type, so that the car is only held on the rail track through its own weight and the flanges. Where it is necessary for such electrically-driven suspension tracks to join on to (say) travelling bridges, by means of slide-switches supported on fixed suspension tracks, no other construction could probably be used, as the line must be free overhead to allow the cars to pass the separate changeable switch points. It must not, however, be forgotten that such suspension rails must be especially supported in crossing large spans. This is, as a rule, effected by means of suspended shoes, which are generally fixed on iron or wooden trestles above the suspension rails. Consequently, if shiftable branches are not in question, T trestles with wide span can be advantageously used as a track, as shown in fig. 24, representing a completely new type of electric suspended railway. As can be seen, four wheels, comparatively close together, run in pairs on the inner side of the under flange of a T trestle.

The flanges of the wheels are again finished as tooth flanges, into which the driving pinion of the tooth-wheel gearing fits. The motor is built in the intermediate space formed by the two sides under the trestle, and completely roofed in. Between these sides the pivot for suspending the swinging car bucket hanger is hung, so that the complete travelling mechanism, including the hanger fastening, forms a structure enclosed on all sides. The motor is placed so far down that, between it and the flange of the trestle, the conduction which takes the current by means of a collector can be carried through. The return-current conduction takes place through the travelling rails. The car buckets, as can be seen from the construction, are not arranged for tipping, but for bottom emptying—giving an extremely low height for the whole plant.

This description of electric suspended railway for level tracks, and with which, as all four wheels are driven, gradients up to 5 per cent. can be taken, is exceptionally suitable for erection in gas-works and retort-houses. The cars, however, run independently of one another; so that variations in the speeds of the cars might occur, caused by differences in load or other small untoward circumstances. This might possibly occasion collisions or delay of single cars, and thereby endanger regularity in the traffic. For

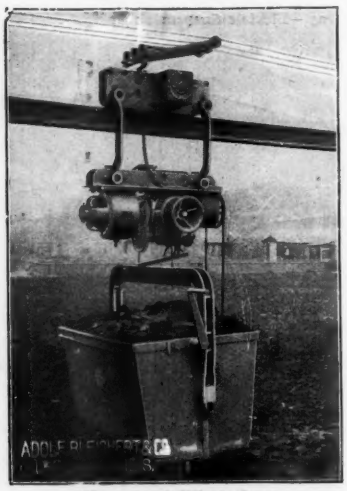


Fig. 29.—A Winch Car.

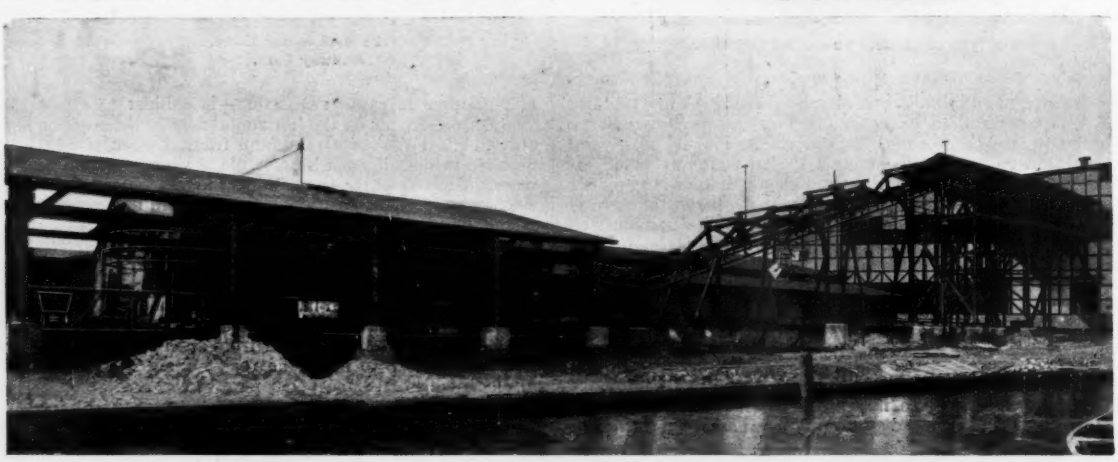


Fig. 28.—The Loading Station of an Electric Suspension Railway with Adjoining Rope Inclined Sections.

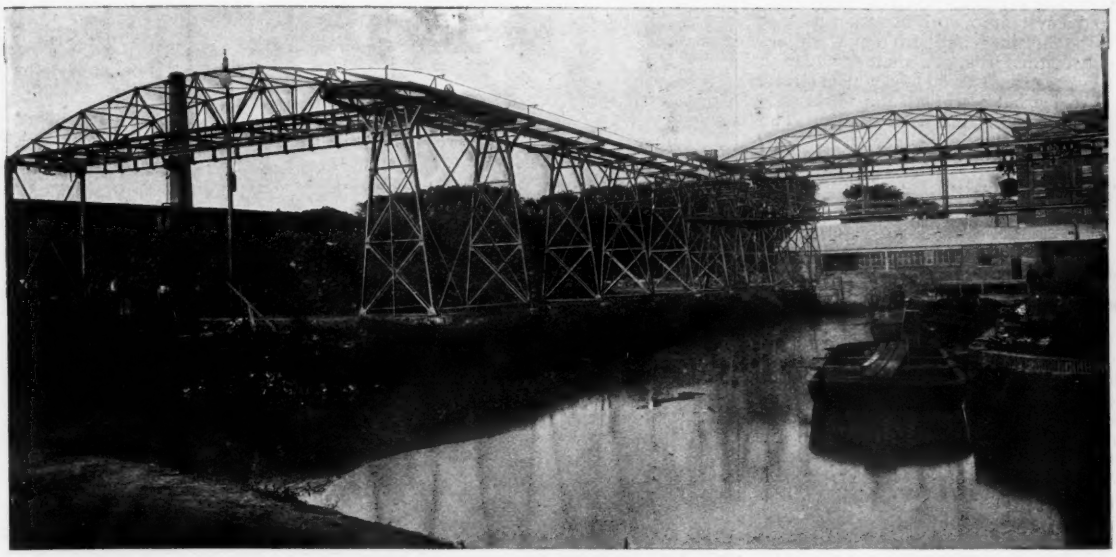
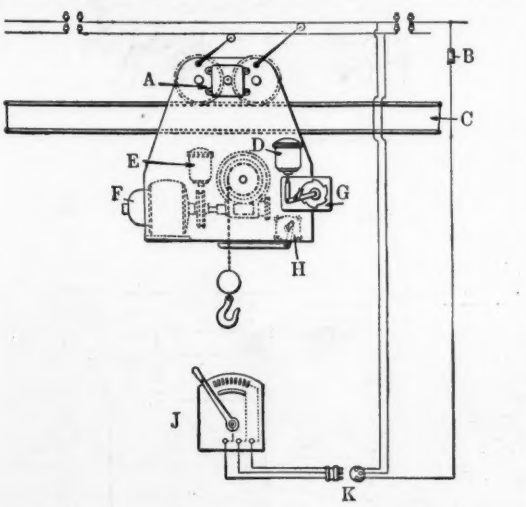


Fig. 30.—A Coal Storage Depot in Holland.

this reason, it is necessary to make some provision to safeguard against such mishaps; and this constitutes a most important factor in the whole system of electric suspension railways. An arrangement of this nature is the protection system constructed by Messrs. Adolf Bleichert and Co., in which the conduction is subdivided into single block lengths. These block-lengths, on being passed, are cut off from the supply conduction by the car itself, by means of switches placed at each block point and mechanically actuated by the carriage. These switch the single travelling sections on and off by two auxiliary conductions, placed in the next block-section beyond the block-point.

In fig. 25, the scheme of such a system is depicted, showing at the same time a safety arrangement for crossings or points. In this arrangement the switches are actuated mechanically by the carriage, and cut off the current from the section of the outer conduction nearest the crossing or siding; whereas the crossing or siding itself remains under current. In this manner, a car can never come to a standstill at the crossings. Such a protective arrangement is at the same time the foundation for the further characteristics of the whole system, and leads for the first time to that most important of points, automatic operation, with its natural corollary, independence from manual labour. For, if the single sections can be switched, operated, and served by the cars themselves, this must be equally possible at the separate section points or for the whole working. The first question is the stopping and the starting. The empty or loaded car, coming in the vicinity of the loading or unloading station, puts a switch into action before entering, which effects its stoppage; so that the only work to be done by the man who fills the cars is the actual loading and the switching on of the car for departure. The emptying in the unloading station is simply effected by the bottom flaps of the car opening automatically on a striker; so that in the unloading station absolutely no attendance is necessary, as the cars themselves run on to the loading station, where they stop. Even the attendance at the loading station can be entirely done away with, as arrangements can be made to effect the stopping, loading, and departure automatically; so that it is only necessary to see that the full hoppers are kept sufficiently supplied.



A. Travelling Motor.
B. Starting Switch.
C. Motor Rail.
D. Travelling Magnet.
E. Hoisting Magnet.
F. Motor.
G. Switch Controller.
H. Unloader.
K. Contact Maker.

Fig. 31.—Electric Hoisting and Lowering Apparatus.

An arrangement of this description, also from the firm Adolf Bleichert and Co., and patented, is shown in fig. 26. This device for the automatic loading of electrically-driven suspension railway cars, is thus contrived. The empty car, arriving at the loading hopper, runs on to a balance or scale beam, fitted as a continuation of the track, detaches automatically with the assistance of a switch, and becomes stationary. At the same time, through this switching off and stoppage on the balance beam, the unloading appliance is put into action by means of an electric motor. The increasing weight of the car which is being loaded lowers the balance beam; and advantage is taken of this motion (also by means of electricity) to close the locking flaps of the hopper and to switch the car on again for running. The car consequently leaves the balance beam and runs on to the unloading station; whereas the balance beam resumes its highest position. Supposing that, in addition to this, a counting apparatus and self-registering weighing-machine are built on the track, the electric suspension railway automatically carries out the whole movements which occur in working, and completes with absolute safety all operations without the assistance of a workman.

The electric suspension railway appliances hitherto described simply represent the substitution of electro-motor driving for the wire-rope driving described at the commencement of this article. There is, however, a fundamental difference between the two systems—driving with guided motion and direct power. With the wire-rope guided motion, all possible differences in level can be surmounted at once by gradients or so-called inclined lines; while the adhesion driving of the electric suspension cars is always limited to horizontal levels with slight divergences.

As already remarked, traffic, which is confined to a horizontal level practically never occurs in gas-works. Differences in level have to be surmounted; and consequently special appliances must be provided to render the employment of electric suspension railway working possible, without prejudicing their use for horizontal traffic. In the development of this system, these considerations led to a combination of guided and direct driving. In their patented electric ropeways, Messrs. A. Bleichert and Co

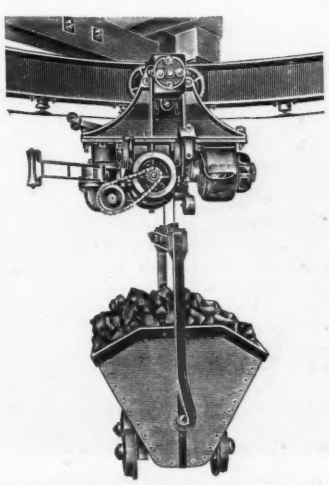


Fig. 32.—A Winch Car for a Double-Rail Track.

created a system to work in such a manner that the hoisting and friction work are entirely distinct from one another, and each runs by means of special mechanical forces. On the horizontal section, the working is purely electrical, by means of motors. The traffic over the inclined sections, however, is managed as shown in fig. 27. The means of traction used—a traction rope in endless motion—runs along the inclined section, and couples automatically with a catcher or traction rope clamp attached to the carriage of the motor. This process of coupling simultaneously switches off the motor. The traction rope now draws the car over the gradient to the horizontal section on a higher level, where it uncouples. At the same moment the motor comes into action, and propels the car until, after unloading, it again reaches the descending inclined section; and the same process of coupling and uncoupling again takes place in reverse order.

This description of electric suspended railways has become of special importance for plants in which very considerable differences in level must be surmounted, combined with the handling of a large bulk of traffic. With traction-rope driving, the gradients are not confined to certain limits, so that it is possible, by means of such an arrangement, to compress an otherwise considerable length of gradient into a very short space, with a correspondingly heavier gradient. Consequently, extended horizontal sections are obtained, only connected by short but proportionately steep sections. It will be at once evident that this system is peculiarly suitable for coal-shed plants with bottom drawing-off.

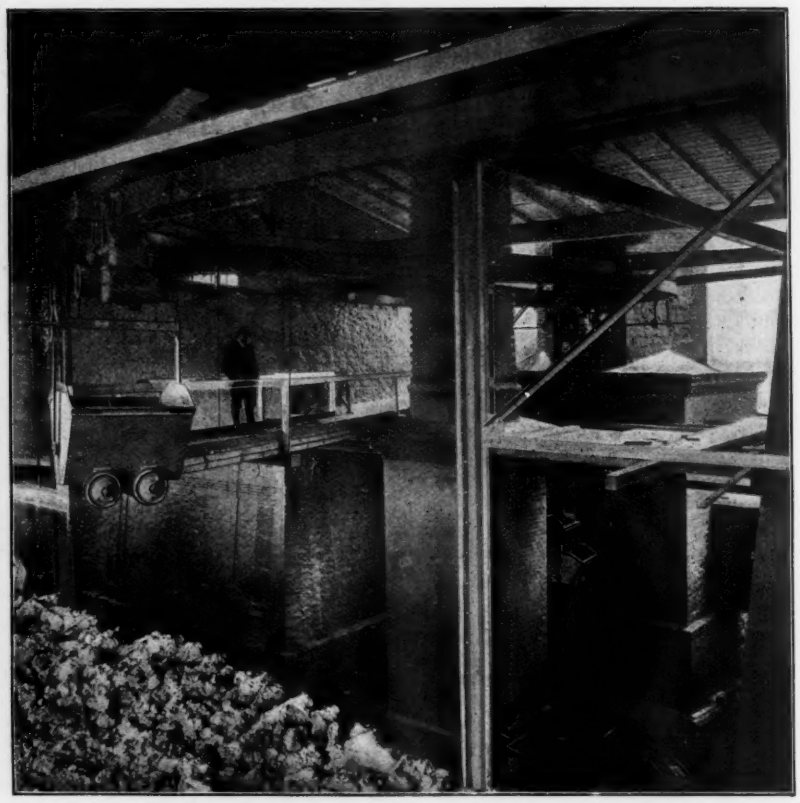


Fig. 33.—The Working Stage of a Bleichert Conveyor.

Hitherto a special drawback to rope-driven horizontal tracks under the coal-hoppers was due to the fact that a comparatively large part of the work had to be done by hand, as the suspension railway car had to be pushed to the loading hopper flaps from the uncoupling points of the traction rope and brought back in the same manner. Apart from the fact that the manual work required is not inconsiderable, although not more than one-third of that required for fixed railways, the traction rope also deteriorates, owing to the insertion of so many coupling points. Further, as already mentioned, the possibilities of expansion for the suspension railway are very limited, because horizontal deflections necessitate special appliances, curves, &c.

By means of this electric working on the horizontal sections, it is possible to dispense with manual labour entirely, except for opening and closing the shoots; and even this can be done electrically, if desired, providing the material is of a uniform consistency. Switches, crossings, and branches can in many cases be automatically set by the cars. The cars, filled at the shoots, are put in motion by means of switches fixed in the vicinity of the flaps of the hoppers, and then run automatically to the inclined bridge coupling points. In front of these coupling points, it is, of course, necessary that the switching arrangements be so made that the cars, although coming from various directions, do not collide. This object is attained by the employment of the block-system already mentioned, so that the cars take up their position before the loading station at intervals determined by the block-switching; and, so long as a car is being loaded, it is impossible for the next one to move on.

Arriving cars wait at a fixed point before the coupling place, until a car travelling on the inclined bridge has run a certain distance, whereupon the first waiting car begins to move automatically and couples itself to the rope. Hereupon all the cars waiting move up one block-length, so that the foremost car runs on to the inclined bridge, which, with its guided driving, effects a permanent adjustment of the distance between the cars. The same routine is naturally repeated at the descent. The empty cars run, without any intervention whatever on the part of the workman, to the proper hopper flap, where they halt until again despatched over the line. The economical advantages of this arrangement are so enormous that a saving of wages and expenses varying up to 70 per cent. is effected, as compared with suspension and fixed railways now in use. Now that exhaustive experiments at Messrs. Bleichert's works have been concluded, a number of such plants are either in work or in course of erection.

Fig. 28 shows the loading station of an electric suspension railway with adjoining rope inclined section; whereas in fig. 27 the

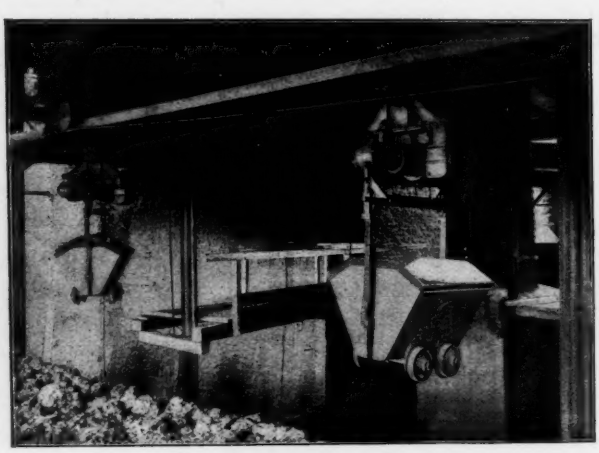
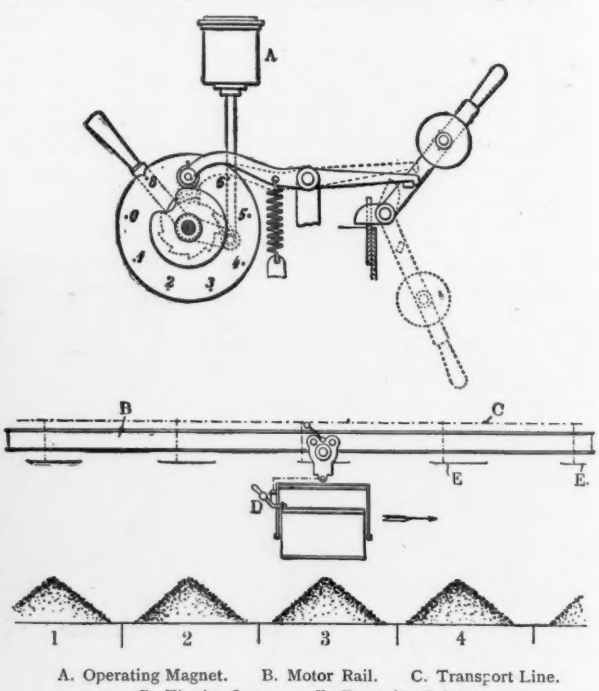


Fig. 34.—The Wheeled Conveying Buckets.



A. Operating Magnet. B. Motor Rail. C. Transport Line.
D. Tipping Lever. E. Emptying Points.

Fig. 35.—Diagram Showing the Working of a Suspension Railway Car intended to be Emptied at Various Points.

scheme of the inclined bridge is given, with an example of the working.

As already mentioned, there is always the possibility that lifts and inclined bridges can only be built at one point of the entire plant, necessitating a circuitous route for the transport line. In older gas-works—which, as is well known, are nearly all very limited for space and in which the enlargements have in no wise kept pace with the productive expansion—there is very often no place to build fixed hoisting appliances—for instance, over coal-storage depôts or coke stacks. It must also be taken into consideration that the hoisting and lowering are generally required at all possible points, and not at one fixed place—*i.e.*, a large space must be covered at all points in two directions, horizontal and vertical. Hitherto this purpose was served, almost without exception, by so-called travelling bridges. These were partly provided with trolleys, partly with heavy rotary cranes, and sometimes with cross auxiliary bridges, and of which several examples will have already been recognized. For the continuous handling of large quantities, these travelling bridges are, without doubt, suitable, but not if a comparatively small bulk has to be conveyed or if the single journeys are only to be made at long intervals.

I will only mention one example—the arrangement for the transport of purifying material, which must be spread over an extensive area, although the time of working is comparatively short. In such cases large travelling bridges with special hoisting appliances would often prove expensive. On the other hand, an electric suspension railway offers most convenient means, not only to reduce the cost of the plant, but also to keep the working expenses within reasonable limits. The simplest construction of such a travelling hoisting appliance (a winch-car) is shown in fig. 29, from which it can be seen that a small winch with separate motor is built on an ordinary electric suspension railway. It carries the load receptacle; and the electric current is brought through a second current conductor lying parallel to the travelling conductor, and receiving its current from the latter. Of course, the current must only be disconnected at the points where hoisting and lowering should take place. For instance, if the suspension railway track connects two stacking sheds across a yard—in which sheds alone the hoisting and lowering are to take place—it is only necessary to employ double current conductors here; whereas, on the track over the yard, they are not required.

Characteristic of this description of hoister is the arrangement of the drums for the rope, which are always fitted in pairs, at right angles to the track, and take up two ropes. This is for the purpose of obtaining a uniform strain on the vehicle and to avoid one-sided pressure on the rails—in fact, it is an important point in the construction of such carriages that the parts be placed in exact symmetry, in order to keep the line correctly in the middle, and maintain the uniform strain on the line. The operating of this carriage is effected, in simple cases, by means of cords running with the car over special rollers, and which put the operating switch into action in the same manner as the travelling motor—that is, by hand. For cases in which considerable distances must be covered, and where the working is comparatively regular, as the same processes repeat themselves, long distance operating may be adopted with advantage—possibly, even automatic operating. A plant of this description, with long distance operating, was built by Messrs. Bleichert and Co. for a coal-storage depôt in Holland. This is shown in fig. 30. The coal coming up in ships can either be conveyed to the storage depôt or direct to the boiler-house.

The introduction of this long distance operating system offers serious difficulties if we have to rely on the switching hitherto employed for such trolleys with winches, because, in general, no less than seven current conductors would be necessary to accomplish the travelling in both directions and hoisting and lowering by electricity. The building-in of sidings in such lines was almost impossible in older plants. To avoid these difficulties, a most original method of long distance operating was invented and patented by Messrs. Bleichert and Co. By means of this it was possible to manage with two free conductors, if the rail be used as return conductor (see fig. 31).

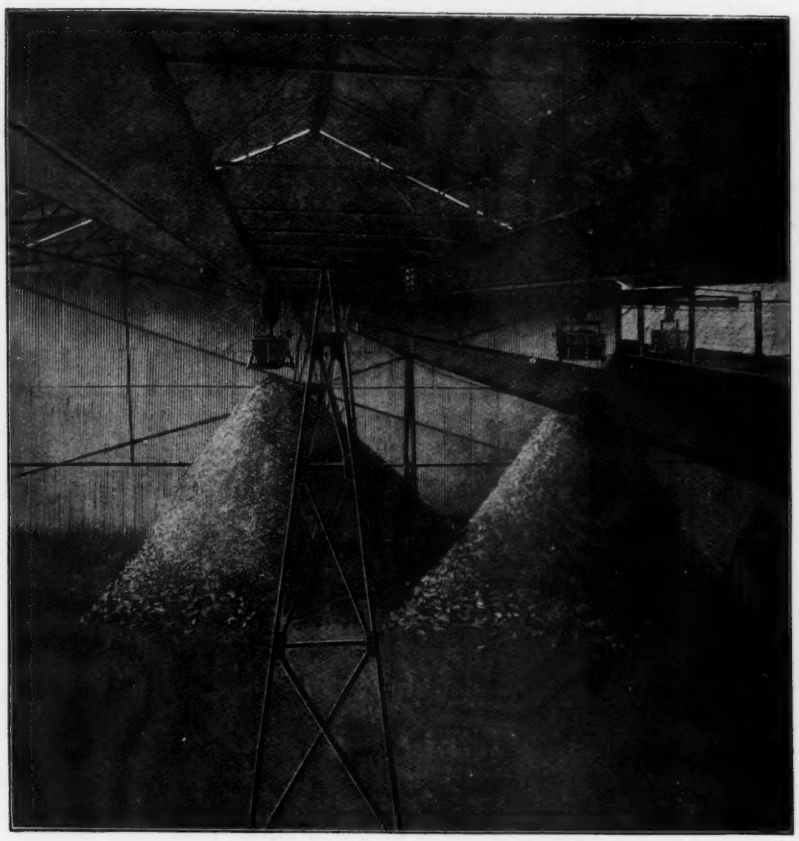


Fig. 36.—Interior of a Coal-Store with Conveyor.

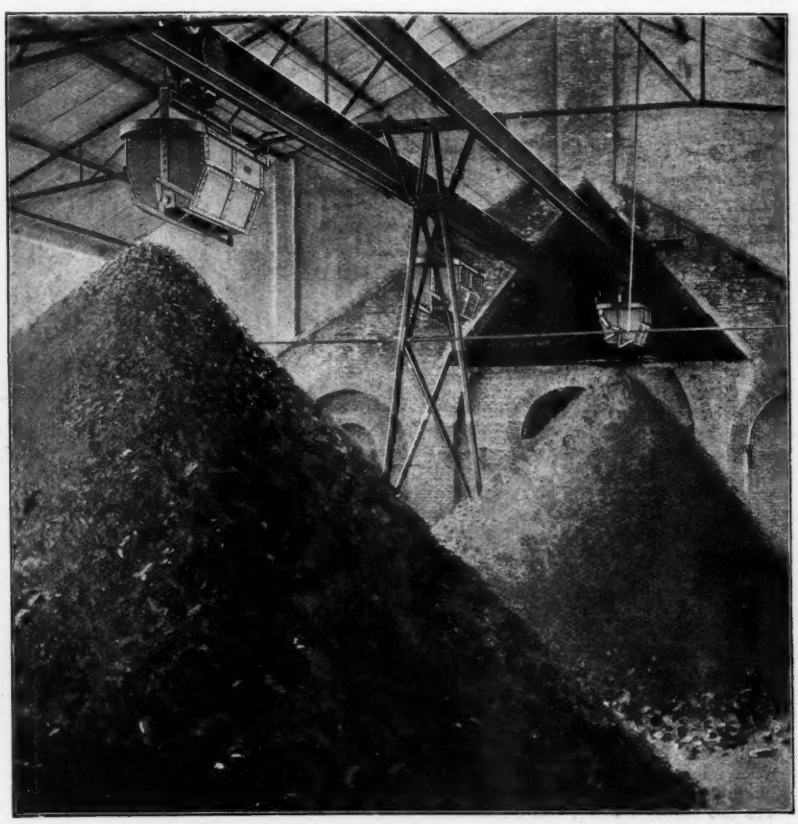


Fig. 37.—An Interior Fitted with the Bleichert Transporter.

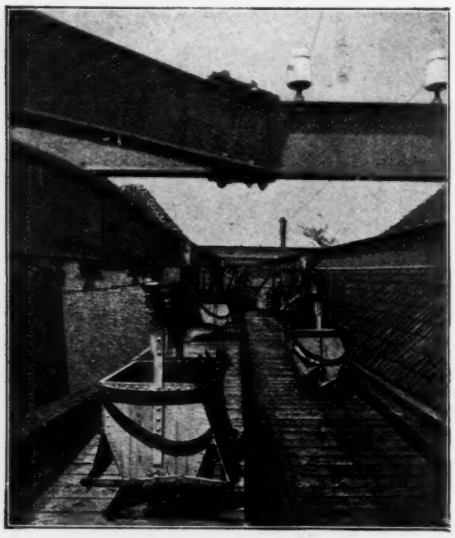


Fig. 38.—The Mechanic's Platform between the Cranes.

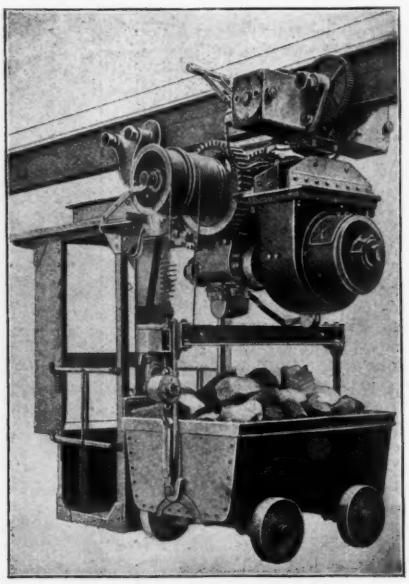


Fig. 39.—The Loaded Trolley on the Travelling Line.

Special contact-conduction, fed from the travelling conduction, is simply attached at the long distance operating points where the hoisting or lowering is to take place. This contact-conduction received current by an ordinary starter, whence it is guided to a switch roller attached to the car and worked by a magnetic catch. From this switch roller, which is provided with suitable contact-pieces, the appropriate switchings are effected for the various movements. Consequently, by simply shifting the starting lever, the workman attending to the plant has only to transmit current shock through the starter to the hoisting magnet working the magnet catch. This starter is attached at any part of the plant desired, either movably or as a fixture. Each current shock corresponds to an advance of one tooth of the switch roller, and each tooth represents a definite adjustment on the travelling or hoisting motor, according as forward travelling, hoisting, lowering, stopping, or return travelling is to be effected.

Under simple electrical suspension railways, I have already described an appliance which permits of absolutely automatic driving on such a track, as the various movements are started by several section-switches arranged on the line, and which the passing cars put into work by means of a striker. This kind of section-switching, together with the employment of a switch roller worked by the movements of the winch itself, also leads to automatic long distance operating for winch cars—a system of operating which has perhaps nearly reached the limit of efficiency to be expected from automatically working machinery. In fig. 32, a winch car for a double T-rail track can be seen. The running wheels are driven by two motors on the sides of the steel plates, and receive current from the bare conduction under the rail; whereas on the side of the running rail a switch conductor is placed for the winch motor. To stop the hoisting and lowering movements of the winch in a special way, a peculiar end cut-off is constructed on the winch car, consisting of a spindle with movable stone, which latter puts the switch roller into work. The working of the spindle, however, is effected (as can be easily seen from the illustration) with the assistance of a chain driving gear, which connects the winch-drum shaft with a tooth-wheel placed on the spindle head. With a suitable adjustment of the spindle with respect to the stone moving thereon, it is possible to attain (to a few centimetres) any desired end position of the car bucket, both in an upward and a downward direction. Most extensive traffic can, therefore, be initiated with the assistance of a single current shock, somewhat as shown in figs. 33 and 34.

In the present case, it is a question of working from a deep-lying point to a lofty point at a distance—for instance, to convey coke drawn from the floor of a retort-house to the storage depôt in the yard. The loaded cars, which are provided with wheels, arrive on rails in front of the stopping place. An empty car arriving at the loading station stops, connects the hoisting winch, lowers the empty bucket, and disconnects as soon as the same reaches the level of the furnace. After replacing the empty car-bucket by a full one, the workman switches on with the starter within easy reach, and which is only put under current for a moment. Hereupon the car-bucket commences to ascend, rises a certain height, and switches the hoisting motor off with the help of the spindle turning with the winch drum, so switching the travelling current on. The car now begins to run, and travels to its destination, where the bucket is made to tip by means of a striker. This tipping takes place while the car is in motion. The car then continues its journey empty until it again reaches its starting point, where it stops and automatically puts down its empty bucket. On the other hand, if the line has not a circular route, it is so arranged that the car stops at the dumping place and, by means of a striker arranged on it, reverses the current of the travelling motor, so that it may return to its starting point by the way it came. In this case, it is naturally impossible for the cars on the line to pass one another. With a circular route, however, the number of cars is not limited; for, as already mentioned, a system of block-switching is adopted which automatically regulates the distance between the cars. Should some unexpected accident cause a car to stop on the line, the cars following also come to a standstill on the currentless sections, until the obstruction is removed and the first car resumes its course, whereupon all the remaining cars follow automatically without any handling on the part of a workman.

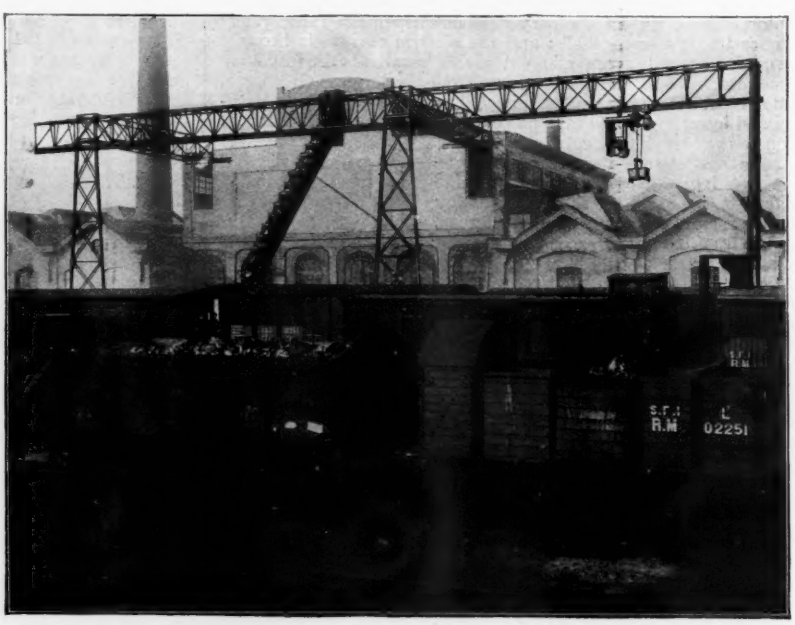


Fig. 40.—A Plant for Loading-up Railway Trucks.

The description of an electric suspension railway on the Bleichert system given here would be incomplete if a further improvement which entirely obviates manual labour with heavy traffic were omitted. This is an invention by means of which, on electric suspension railways with long distance or automatic operating,

any desired movements, &c., of the separate cars can be initiated at various points of the line. This is effected without any special attendance at such points; on the contrary, the setting for any movement desired is to be carried out beforehand by the workmen, either at the loading station or, alternatively, at any end of the line.

In addition to the movements already mentioned—viz., hoisting and lowering, tipping, stopping, attendance on filling appliances at various points of the line, regulating the weighing appliances and working the block sections, the principal movement in question is changing the points on lines with sidings and branches, in order to get at any branch point desired. If the workman for loading from his fixed position desires to effect any one of the actions described, he simply uses a patented appliance (see fig. 35), the principle of which is as follows: At those points where the desired work is to be carried out by means of suspension electric railway cars, a short section of the current conduction is branched off from the main conduction, which is passed by a special current taker. This guides the current to a hoisting magnet, or to the motor doing the work in question. Here, again, a switch apparatus is employed which moves on one tooth with each current shock. With the switch-wheel of this apparatus a curve or speed pulley is coupled, which effects the locking or unlocking through the catching of a latch in one of its divisions, and thus mechanically starting the working operation desired.

As an example of such a design, the scheme shown in fig. 35 will suffice, in which an electrically-driven suspension railway car is to be emptied at various points as desired—say, at 1, 2, 3, or 4, as is frequently the case with bunkers in retort-houses. Suppose that the emptying of the coal is to be done by tipping. The adjusting arrangement built on the hanger consists of a figure dial on which the separate points of working are marked. In front of this dial a lever with pointer moves, by means of which the appliance is set at the point at which the tipping is to take place. The pointer-lever is fixed on a shaft with a switch-wheel, the number of teeth on which correspond to the signs on the dial; while the lock holding the tilting mechanism consists of a curve sheave with a spring lever and locking latch. If the attendant wants to tip the car at (say) point 3, he sets the lever at 3 and despatches the car. On reaching point 1, the lock is moved up one tooth by the magnet, and again one tooth each at points 2 and 3; and thus the lever turns back to zero on the figured dial. In this position the holding lever falls into the division of the curve sheave, which then sets the car-bucket free, so that it tips.

In addition to the means of transport hitherto described, and which have in general long distance operation or complete automatic attendance—that is, automatic operation—I must proceed to briefly mention several others which combine the special nature of electrically driven suspension transport with the possibility of hand operation at all points. In very many cases the bulk to be conveyed is not large enough to make it likely that the plant would pay with transport lines working continually—that is, with a considerable number of cars. Again, unbroken transport may be impossible, because the special character of the working will only permit movements in bulk from case to case. The expedient has therefore been adopted of building electric suspended railway cars provided with a stand for a mechanic, so that he continually moves with the load. This comes especially into consideration in cases in which numerous branches and the necessity of frequent loading or distribution at various points would likely render long-distance operating too complicated, or when the stocking yards are so full that they are rendered impassable. Such a trolley for a mechanic's platform forms a certain link between cranes and travelling or rotary cranes for very heavy loads, as well as electric suspension railways.

In figs. 39 and 40, such a trolley is shown with the travelling line belonging thereto. This appliance serves to load or unload coal and coke from railway trucks, and to effect a connection between the railway station and a large covered-in coal and coke depôt. In the interior of the building the suspension line branches off in several directions, and, by means of two tracks leading outwards, joins on to a longitudinal track crossing the railway. This track is connected, by means of horizontal sliding switches, with block safety appliances to the two outward running tracks.

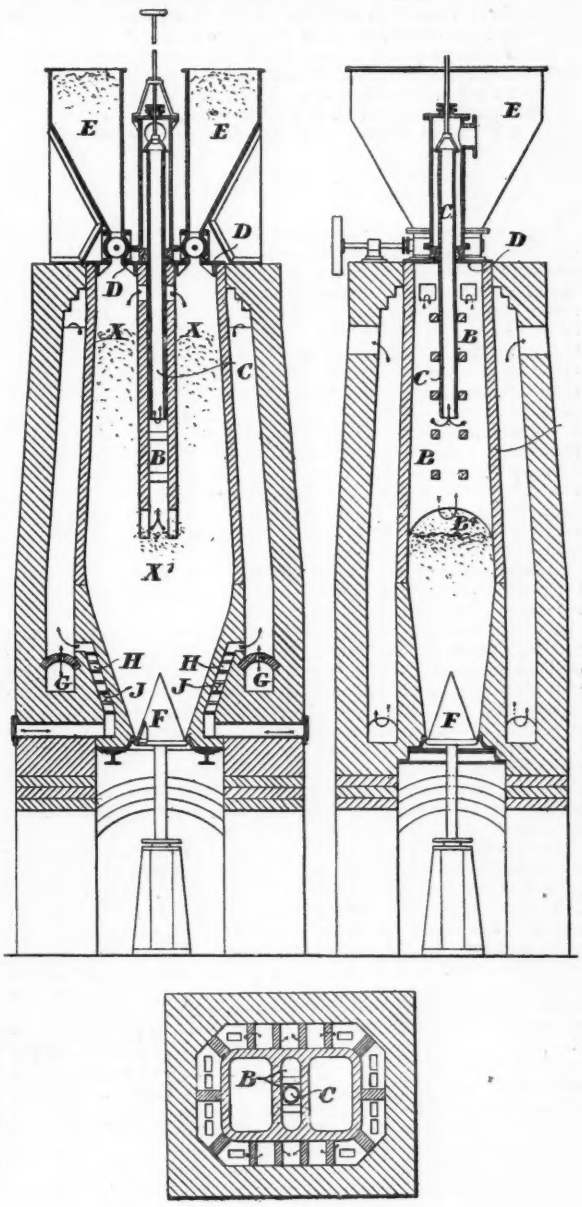
(To be continued.)

The Late Mr. Young's Bequest to Peebles.

Our readers may remember, in connection with the notice of the life-work of the late Mr. William Young which appeared in our columns just after his death, that it was mentioned that he had bequeathed his estate of Harehope to the burgh of Peebles, for the purpose of founding a sanatorium for consumptives. We learn from Mr. J. Gordon Mason, the Agent for Mr. Young's Trustees, that he has just received from the Town Clerk of Peebles (Mr. J. W. Buchan) a letter informing him of the burgh's acceptance of the bequest. This was done by a resolution unanimously passed at a meeting of the Town Council last Tuesday, on the motion of Sir Henry Ballantyne, in the following terms: "That the Council appreciate the kindly feelings towards the burgh and the love for his fellow-men which prompted Mr. Young's generous bequest; and that, on behalf of the community, they gratefully and thankfully accept the trust." As already intimated in the "JOURNAL," the bequest is subject to the life-rent of Mr. Young's son.

BROWNE'S VERTICAL RETORTS.

Among the patent specifications issued last week was one bearing the name of Mr. A. F. Browne, of the Vauxhall Works of the South Metropolitan Gas Company. It is numbered 11,099 of 1906; and the patentee claims as his invention: "The manufacture of gas from coal and other solid carbonaceous material in vertical retorts of the type in which practically the whole of the gas evolved from the material is first collected at the upper end of the retort and then conveyed downward through suitable pipes or chambers, characterized in that the gases are conveyed downward through pipes or chambers, surrounded by, or embedded in, the incandescent material in the retort, to a predetermined position or zone of heat therein, whereby the whole of the gas, without being passed through the incandescent material, will be subjected in the heat zone to a temperature sufficiently high to permanently gasify the otherwise condensable bodies without unnecessary reduction of their illuminating or heating value."



Browne's Arrangement of Vertical Retorts.

The patentee remarks: It has been proposed to carbonize coal in vertical retorts by introducing the coal in small quantities at regular intervals, so as to build up and maintain a mass of incandescent material having on the top a layer of coal in the initial stage of the process of carbonization—the gas driven off therefrom passing away without coming into contact with the mass of incandescent material.

It has also been proposed in some cases to lead the gas downward, by passages lying at the side of the retort, into a further separately heated retort, for the purpose of permanently gasifying the otherwise condensable products thus far obtained from the first retort, in which case the heat of the incandescent material

in the generating retort was not employed for obtaining the permanent gasification. It has been further proposed to convey gases from a retort by pipes opening some way down the retort within the mass of incandescent or coking material. In this case the gas was necessarily passed through the mass of the material in contact therewith. It is one of the objects of the present invention to avoid the passing of the gas through the incandescent material itself, although using the heat of the incandescent mass for the purposes set forth.

It has also been proposed to employ vertical retorts with perforated walls, wherein the gas escaping through the walls of the retorts throughout their length is led away by passages surrounding the retort, and passing up and down around same. In such a case the gases passing from various positions in the retort were not collected at the top, and some were brought into contact with the heated walls for a greater length of time, or in contact with a greater length of heating surface, than others; and, moreover, "the construction of the perforated walls is very objectionable in practice, owing to the clogging and stoppages which would occur." The present invention relates to the type of retort where the whole of the gas is collected at the upper end of the retort, and where the side walls of the retort are solid.

It has been proposed to pass water gas already generated into and through a retort in which carbonaceous material is gasified; the water gas and carbonaceous gas passing away together after being separately heated in a further retort. In so far as the present invention includes the manufacture of water gas, it is limited to the introduction of steam for this purpose to the incandescent mass of material lying in the retort in which the carbonaceous gas is generated and treated for permanent gasification.

The invention has for its object to employ the heat of the incandescent mass (or some of it) to ensure that the condensable products evolved from the upper layer or layers of fresh coal shall be recovered or retained as permanent gas—such retention being only possible when the evolved condensable products are subjected to sufficiently high temperatures for sufficiently long periods. The invention also has for its object to prevent the gas being subject to temperatures which would be so excessive as to reduce unnecessarily the value of the permanent gases thus obtained.

To this end the gases evolved from an upper layer of carbonaceous material are conveyed downward through pipes or chambers surrounded by, or embedded in, the incandescent material in the retort, to a predetermined position or zone of heat therein, whereby the whole of the gas, without being passed through the incandescent material, will be subject in the heat zone to a temperature sufficiently high to permanently gasify the otherwise condensable bodies without unnecessary reduction of their illuminating and heating value—"the result also being a substantially constant quality of gas."

The patentee claims that he may also combine with such methods means for introducing water or steam into the incandescent material for the purpose of producing water gas, which gas, when produced, preferably passes away with the gas produced from the carbonaceous material; also to return to the retort any of the condensable products recovered from the resultant gas, with the object of utilizing as permanent gas any volatile products which may have escaped gasification. The invention does not, however, "contemplate the gasification of liquid or condensed products alone but only with or upon the solid material."

As shown, the vertical retort or oven is so constructed that the products leaving the surface of the coal at X rise to the top of the retort and pass into a fixed vertical pipe or trunk B through apertures in the walls, by which trunk they are conveyed downwards to the zones of higher temperatures existing within the incandescent mass X^1 below the surface. The vertical pipe or trunk B is constituted by the space between two partitions built across the middle of the retort, whereby the upper part of the retort is divided into two so as to form what may be termed a "twin retort." Within the fixed vertical trunk is placed (preferably in a central position) an eduction pipe C, smaller than the trunk B, and which may be raised or lowered telescopically within the trunk, or it may be fixed in regard thereto. Suitable ties are built across the trunk to strengthen it.

The space between the fixed trunk B and adjustable eduction pipe C and that part of the trunk which is below the lower end of the pipe constitutes a superheating or fixing chamber for the permanent gasification of the condensable products. The pipe C is open at its lower end; and upon arrival at this point, the direction of the flow of the gas is reversed—the gas entering the pipe and passing upwards out of, and away from, the retort. The gas which may be evolved from the incandescent mass below the lower portion of the fixed trunk, which is also open at its lower end, may pass up into it and away with the gas coming down from the upper end of the pipe (as indicated by the arrows). The upper end of the retort is provided with a cover D, through which the telescopic pipe C passes by a sliding connection and seal. Above the cover the pipe C may be surrounded by another chamber, to which the gas passing up gains acces sby the open end of the pipe or apertures in the side of it—the gas being led from the latter chamber to its destination. The pipe C is raised or lowered by means of a screwed spindle and hand wheel or by other suitable means. In practice, however, it may be found that the best results are obtained when the inner pipe B is in a certain position, in which case the adjusting device may be dispensed with, and the pipe C supported with its open end at a predetermined height within the trunk B.

This allows such control of the processes of gasification as will enable modifications of the gaseous and liquid products of carbonization, whether chemical or physical, to be secured and maintained by conveying such products to any desired depth, point, or heat zone in the incandescent mass—the modification being brought about by exposure of the permanent gas and condensable products to higher or lower temperatures of the more or less incandescent mass of partially carbonized or coked coal as may be determined by the position of the pipe C within the trunk B and the temperature in the space between the pipe or trunk or the heat of the space within the pipe B, where the gas passes to before leaving by the eduction pipe C—that is to say, the gas may pass down for a distance somewhat beyond the end of the eduction pipe, due to its volume and the rate it is flowing.

For the purpose of obtaining a constant quality of gas under the foregoing conditions, it is necessary or preferable, says the patentee, to feed the coal to the retort continuously, or at regular, though intermittent, periods of time—in either case without interruption to the process of gas making. It is further desirable or preferable that the coal fed to the retort be evenly spread upon the surface of the coal already undergoing carbonization, either mechanically or by suitably controlled gravitation. The coke or solid residue remaining after the expulsion of the gas should be removed from the retort, either continuously or at regularly intermittent periods, without interruption of the process of gas making.

In the apparatus illustrated, the coal is fed at the top of the retort from hoppers E by a spiral or worm feed; but any other suitable feed device may be employed. The coke or solid residue at the bottom of the retort is similarly discharged in any suitable manner—for instance, by a cone-valve F (such as is used for vertical retorts) operated hydraulically or otherwise. G is the fuel-gas flue leading to the combustion nostrils, H is the secondary air-supply passage, and J are diaphragms for deflecting the burning gases on their way to the chimney.

The processes of feeding coal to the retort and of withdrawing coke from it are so adjusted that the level of the mass in the retort and its vertical height shall be maintained practically constant. The foregoing conditions require that the coal shall be fed to the retort at the top and shall pass by gravitation to the bottom of the vessel, where the solid residue shall be removed as described. The retorts employed under this invention may be circular, oval, Ω-shaped, square, or rectangular. In the twin retort shown in the cross section, the retort as a whole is of square or rectangular shape with rounded corners. In vertical section the retort may be parallel-sided, tapered upward or downward, conical, V-shaped, or ridged in W-form "as may be found to facilitate gravitation of the mass to a point or points of withdrawal, or to take advantage of the natural angle of repose of the mass for the maintenance of a level upper surface coincidentally with the removal of the spent material from the base."

In the event of the superficial area of the retort being, for reasons of convenience or economy, increased so considerably that the volume of gas evolved should become too great for removal by one trunk and eduction pipe, the number of such devices may be increased and spaced apart over the surface as may best suit the purpose of this invention, and, if required, one or more adjustable or fixed eduction pipes may be disposed within one fixed trunk.

Further, it is contemplated in connection with this invention to utilize the retorts for the production of water gas, whether continuously or intermittently, with a view to saving or economizing the heat of the incandescent mass of coke in its passage to the point of withdrawal by dissociation of steam and gasification of carbon in the usual manner—the water gas mixing with the coal gas and passing away with it by the eduction pipe C.

Further objects sought by this invention are the following: To avoid undue impoverishment of the gas evolved from the coal by excessively high temperatures. To prevent or reduce the formation of naphthalene. To avoid excessive dissociation of gases and the deposition of separated carbon so far as these are due to very high, or unnecessarily high, temperatures of carbonization. It is further contemplated to return to the retorts, as often as may be necessary, any gas or vapours, tars, oils, or like condensed or condensable bodies which may in greater or less quantity have escaped permanent gasification in the working of the plant; and, further, to employ the invention, if desired, for the permanent gasification on a large scale of tar, oils, and other like bodies, whether vegetable or mineral.

The Discussions at the North of England Meeting.—In the report of the discussion on Mr. Lees' paper at the meeting of the North of England Association which appeared last week (p. 311), the author's reply to Mr. Tobey did not adequately represent his statement. Mr. Lees said his reference to cost of capital was confined to what was raised during the periods named in the paper. In the discussion on Mr. Wood's paper (p. 313), Mr. T. Bower, of West Hartlepool, it may be remembered, gave some interesting figures in regard to the public lighting of the town. He asks us to mention (which he regrets he omitted to do at the time) that they were largely supplied by Mr. Nelson F. Dennis, Assoc.M.Inst.C.E., the Borough Engineer.

FLUCTUATIONS IN COAL AND COKE PRICES.

[COMMUNICATED.]

THE accompanying diagrams show the movements in the prices of coal and coke during the past twelve months; and the extent of the rise is undoubtedly very largely due to a cause which all home users of coal strongly deprecate—viz., the removal of the tax on exported coal. No good reason can be assigned for the action of the Government in so favouring the foreign manufacturer; thereby enabling him to compete with our own manufacturers on more advantageous terms. It seems a suicidal policy, and certainly does not benefit anyone but the colliery owner and the miner.

The figures, which are the f.o.b. prices on the Tyne, are taken from the weekly quotations for Durham gas coals published in the "JOURNAL" under the heading "Northern Coal Trade." Two extreme prices are quoted weekly—usually varying from 9d. to 1s. 6d. per ton, according to the quality of the different coals. In Diagram I., the mean price is taken.

It will be noticed that the price of coal fell slightly during May of last year, and for a few weeks in June only just exceeded 9s. per ton. It then rose to 10s. 6d. in the middle of August, and was fairly steadily maintained at this price till the beginning of January, when it rose very rapidly (in the space of six weeks) from 10s. 7½d. to 12s. 7½d.—a price which was reached in the middle of February. It will be remembered that at that time there was a very brisk demand for coal of all kinds, owing to the cold weather; and prices were put up in consequence. For the last two months, the price has been fairly steady—fluctuating between 12s. 3d. and 12s. 9d.

There has lately—fortunately for gas companies—been a good market for coke, and much of the extra cost of coal will be counterbalanced by better prices obtained for its chief residual; for the latter not only commenced to rise earlier than did coal, but has also risen in greater proportion. Experience goes to show that in times of high coal prices the increased return realized from coke counterbalances about half the extra cost of coal. Diagram II. shows the mean weekly prices of coke quoted in the North to correspond with the prices of coal quoted on the Tyne.

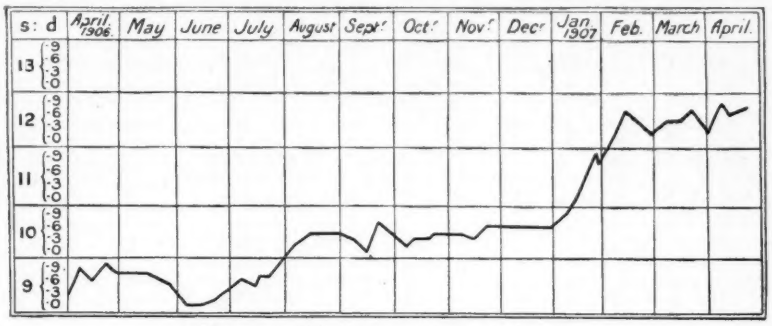


Diagram I.—Price of Coal per Ton, F.O.B. Tyne.

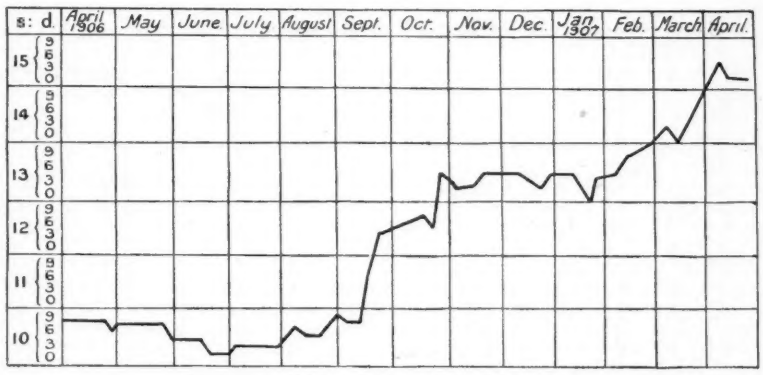


Diagram II.—Price of Coke per Ton, F.O.B. Tyne.

Sir George Livesey, at the last meeting of the South Metropolitan Gas Company gave a few figures to show the enormous fluctuations in the price of coal in past years. Prior to 1872, the price was very steady at 5s. 6d. to 6s. per ton f.o.b. on the Tyne; but in that year it rose to 20s., and did not again decline to 6s. till 1877. An average price was maintained till 1889, when the price rose to 7s., and in 1890 to 11s. In 1893 it had fallen to 6s. 3d.; but a gradual rise to 6s. 9d. again took place during the next five years. Coal rose to 7s. 11d. in 1899, and to 16s. in 1900; and then fell very gradually during the next five years. In 1904 it reached 7s. 6d.; increasing to 8s. 3d. in 1906.

From these figures it will be seen that there have been three "booms" in the coal trade since 1872, and the "boom" at the present time makes the fourth. On all the previous occasions it has been necessary to increase the charge for gas; and it is almost certain that many undertakings will be forced to repeat this procedure on the present occasion. All engineers greatly deplore the necessity for doing this; and it seems that, as the fluctuations in the price of coal are quite beyond their control, regularity in the price of gas can only be maintained by making provision during periods of low coal prices, when the increase of the "balance carried forward" would not be a difficult matter. If this were systematically carried out, it would be quite possible to maintain absolute regularity in the price of gas, and thereby ensure the continuance of the rate of dividend in sliding-scale companies; for nothing so impairs the credit of any undertaking as the fluctuation of the dividend. The credit of gas companies, owing to the nature of the commodity supplied, is superior to that of other industrial concerns; and for this reason it is extremely important that the esteem in which gas securities are held should in no way be jeopardized by variations in dividends.

Suggestions have been made (notably by Mr. Corbet Woodall) that the disastrous fluctuations in the price of coal should be regulated by a sliding-scale, in much the same manner as that in operation with such success among so many gas companies. The sliding-scale was indeed a happy thought; and it is quite certain that much of the success of the gas industry is due to its introduction. The principle of the system is so excellent that its adoption in other and similar industries is greatly to be desired. But whether or not a sliding-scale system is the remedy for the fluctuations in the coal market, it certainly seems that legislation is needed to regulate the price of our national fuel.

CALCULATION OF ILLUMINATION.

A recent issue of the "Journal für Gasbeleuchtung" contained an article by Dr. L. Bloch, of Berlin, in which the author describes two methods for calculating the amount of illumination present in a street or public place and in a room or public hall respectively. In the case of outdoor lighting, he considers that the surface receiving the illumination should be horizontal, 5 ft. above the ground; while in a room or the like, the surface in question should vary, according to special conditions, from 3 ft. 6 in. to 5 ft. above the floor.

OUTDOOR LIGHTING.

For application to a road, the author's method is carried out as follows: An imaginary line is drawn along the road, parallel to its length, between two neighbouring lamps, and along it equidistant measurements of the illumination received by a horizontal surface 5 ft. from the ground are made to the number of between eight and twelve. Similar measurements are also made between a second and perhaps a third pair of adjacent lamps, lest errors should arise owing to any imperfection in one of the first pair studied. If the lamps are all of them spaced at approximately equal distances, the figures so obtained may be averaged and the results plotted on a curve. But should time permit, a second series of measurements may be carried out over another imaginary line lying parallel to the first; the second line being either above one of the kerbs if the lamps are suspended centrally over the roadway, or in the centre of the road if the lamps are on either side. If the lamps are at different distances apart, the imaginary line must extend over the distance between three lamps, and the curve (which for convenience in reference may be termed Curve A) must be plotted so as to indicate the illumination on surfaces lying at equal distances on either side of a lamp in the middle of the piece of roadway under consideration. An ordinary illumination curve (Curve B) is then procured showing the illuminating power at different angles below the horizontal afforded by a source of light similar in character to those employed in the road. The amount of light emitted by the source of light represented in Curve B need not be identical with the light thrown by the lamps used in the road, provided only its distribution is similar. Calling I the amount of illuminating power afforded by the light in Curve B at any depending angle (α), calling the height of the lamp above the receiving surface h, and the distance of the receiving surface from the base of the lamp a, the amount of illumination falling upon the receiving surface E is shown by the following formula, where r is the diagonal of a parallelogram the sides of which are equal to a and h respectively:

$$E = \frac{I \times \cos\alpha}{r^2} = \frac{I}{a^2 + h^2} \times \frac{h}{r} = \frac{Ih}{\sqrt{(a^2 + h^2)^3}}.$$

With the aid of the data so obtained, a table is then drawn up having thirteen vertical columns, and as many horizontal lines as there are different positions of the observing surface between two adjacent lamps. In the first three columns of the table are marked in succeeding lines the relative distance from each of the three lamps of each receiving surface. In the fourth column is recorded the amount of illumination falling on each surface in the left half of Curve A. In the fifth column is marked the amount of illumination received by each surface in the corresponding position in the right half of Curve A. In the sixth column is marked the mean value of the two. In the seventh, eighth, and ninth columns of the table are shown the amounts of illumination which should fall on the surface at each of the observing positions from the three individual lamps if those sources of light had the numerical value indicated by Curve B; the tenth column indicating the total of the three preceding columns. If the lamps in actual employment do not afford the same illuminating power as the lamp represented in Curve B, the values in column 6 of the table will not be the same as those in column 10. Hence a factor must be found to render each figure in column 10 equal to the corresponding figure in column 6; and with the aid of the factor so obtained, columns 11, 12, and 13 are prepared, showing the actual amount of illumination falling upon the receiving surface at each observing distance from each of the three lamps under examination—the totals of column 11, 12, and 13 being thus identical line for line with the figures in column 6. These figures can then, if desired, be plotted upon a curve (Curve C). If a second row of observing positions is treated similarly, the results are recalculated as already described, and the final figures are plotted upon C also. In this manner are provided means for calculating the amount of illumination falling upon a horizontal surface from one or more of three adjacent lamps—those further off may be ignored—at any point on the carriageway or foot-path. This last operation is conveniently performed by dividing any half section of the road into a suitable number (from 10 to 20) of rectangles, marking off the centre of each, measuring its distance from each of the adjacent lamps, ascertaining from Curve C the amount of illumination falling upon the surface from each lamp individually, and adding the results together. The mean illumination for the whole half section is given by averaging the amount of illumination at each central spot in the rectangles. Curve C also serves to show the positions of maximum and minimum illumination, and to deduce the amount of light thereat. If each standard carries more than one lamp, the whole may be treated as a single source.

It may perhaps appear simpler actually to measure the illumination present at the centres of the various rectangles just mentioned instead of calculating it. Actual measurement is, of course, possible; but if the results are to be trustworthy, it must also be repeated in two or three different positions along the road, and the mean figures calculated. As a rule, however, it is not convenient to make so many measurements along a road, and so the arithmetical method proposed by the author may often be useful.

Interior Illumination.

In the case of interior illumination it will frequently be found easier to subdivide the room into a convenient number of rectangles, to ascertain the horizontal illumination at the centre of each rectangle, and to calculate the mean horizontal illumination from the figures so obtained by averaging them. If, however, this process is impossible, or if there are a large number of lamps in use and the reflecting power of the walls and ceiling is considerable, it is not safe to deduce the illumination from the conjoint action of each individual source of light. If the room is approximately square or circular and the lamps are disposed symmetrically in it, two or three diagonals may be drawn across the room, and the illumination falling on horizontal surfaces between 3 ft. 6 in. and 5 ft. above the floor may be measured in numerous positions. The points of observation and the illumination values are next inserted on a plan of the room, and the distance of each point from the centre is marked off. From this plan, a curve can then be drawn showing the illumination at different positions according to the distance from the centre. One quarter of the room is next divided into from ten to twenty squares or rectangles; the distance of each centre from the centre of the room is measured on the drawing; and the illumination at each centre is deduced from an inspection of the curve. The average of the illumination at the centre of each rectangle then gives the mean illumination in the room. Should the room be much longer than it is wide, the positions of observation should be situated in two or three lines parallel with its major axis, and the rest of the calculation should be carried out as before. It must, however, be remembered that in a room specially good illumination is often required at particular spots, so that general rules for judging the lighting effect cannot be drawn up.

A Simplified Method.

The foregoing method for measuring and calculating the mean horizontal illumination present in a road or a room gives accurate results, and can be carried out without very much experience. In practice, however, a simplified method which should not require so many measurements and so much calculation would be frequently acceptable provided it led to fairly trustworthy conclusions. From a large number of experiments carried out by the author, he finds that the mean horizontal illumination present can be calculated with fair accuracy from the maximum and minimum illumination. It is, of course, necessary that the values for the maximum and minimum should be ascertained (when possible) by averaging the individual figures at several positions—say from four to six; and care must be taken that such positions are chosen for the measurements as do not exhibit abnormal conditions owing to shadows or the like. The actual positions where the maximum and minimum illumination prevails can be judged by the eye or by a few quick tests. The method of calculating the mean horizontal illumination from the maximum and minimum depends upon the uniformity of the illumination. In interiors the maximum illumination is seldom more than three times the minimum illumination, and in such cases the mean horizontal illumination may be ascertained directly by taking the arithmetical mean of the two. In streets, however, the ratio of the maximum to the minimum is much higher, and another formula must be employed to calculate the mean illumination. As a result of the experiments carried out by Dr. Bloch in different streets of Berlin and Charlottenburg, and several rooms where either gas or electricity is used in different forms (full details of which are given in his original paper), he comes to the conclusion that when the maximum illumination is more than three times but less than seventy times the minimum illumination the mean may be calculated by the following formula, where E is the illumination in question:

$$E_{mean} = 0{\cdot}18\ (E_{max.} + 10\ E_{min.}).$$

When the maximum illumination is more than seventy times the minimum illumination, the mean is obtained thus—

$$E_{mean} = 0{\cdot}10\ (E_{max.} + 10\ E_{min.}).$$

The figures quoted by the author show that the mean values deduced seldom show errors from the truth exceeding 10 per cent., and in no case differ by 16 per cent. from the truth.

PREPARATION OF TEST SULPHURIC ACID.

By H. Leicester Greville, F.I.C., F.C.S., &c.

The preparation of the usual 10 per cent. sulphuric acid mainly used for the testing of gas liquors is a comparatively simple matter. A roughly prepared solution may amply suffice for the use of ordinary workman checking the strength of ammoniacal liquor, day by day, from the ordinary washers or scrubbers—employing the usual roughly graduated measures and a fragment of litmus paper. There is, however, another aspect of the case. In the preparation of the usual 10 per cent. sulphuric acid, a little more care will ensure an absolutely correct solution, which will be available for higher purposes—such, for instance, as the estimation of the percentage of ammonia in ordinary ammonium sulphate, and the accurate determination of ammonia in gas-liquors.

The ordinary method employed for the preparation of 10 per cent. sulphuric acid is well known; but I will quote from Mr. Butterfield's "Treatise" the usual method of procedure:

> Dilute 16½ oz. by weight of ordinary pure acid of specific gravity 1·84 to 1 gallon with distilled water. The specific gravity at 60° Fahr. should be 1·0644.
>
> It is easy by using a slight excess of acid to (if the specific gravity is in excess) dilute with water to procure the requisite weight. This will give a test-acid of sufficient accuracy for works purposes; but for extreme accuracy, a check should be made by chemical methods, of which there are two. One is standardizing against a weighed quantity of pure sodium carbonate; the other is determinating the H_2SO_4 by the usual process of precipitation by barium chloride and weighing the amount of barium sulphate obtained.
>
> 10 cc. of the test solution (at 60° Fahr.), if correct, should give 2·378 grammes of $BaSO_4$.

A fresh method has been proposed by Mr. F. W. Richardson in a paper read recently before the Yorkshire Section of the Society of Chemical Industry. It is quite a new departure; but the results tally with the older method of procedure. The author seems to be aiming at the elimination of possible errors from the use of measuring vessels, and to rely purely upon gravimetric methods. In this he is, no doubt, instinctively right; but, if there were not methods of checking the accuracy of burettes, pipettes, and graduated flasks, volumetric analysis (of which Mr. Sutton is the exponent) would not have become a recognized method of facilitating work and saving time without (with due precautions) any sacrifice of accuracy.

It is, however, interesting to give an account of the latest idea in the preparation of standard sulphuric acid. The method is to saturate a measured volume of the acid in a platinum dish with a pure solution of barium hydrate, using phenolphthalein as the indicator. The solution is then evaporated in the water-bath to dryness; a cover is placed on; and the residue is heated (preferably by a chimney argand burner) to absolute dryness—eventually to a red heat. From the barium sulphate so obtained, the percentage of H_2SO_4 is calculated.

It is doubtful whether this method is more accurate or expeditious than the ordinary methods previously in use; but one result of the investigation is at least satisfactory—viz., that it was found that the ordinary pure sulphuric acid of commerce did not contain more than 0·008 per cent. of residue after evaporation. This so far establishes the fact that the ordinary strong sulphuric acid which is usually relied upon as the basis of the preparation of accurate test-solutions, can be depended upon, and contains no amount of impurities liable to vitiate results, no matter what the methods of checking test-solutions may be.

WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.

Annual Meeting at Neath.

The Second Annual Meeting of the Institution was held at the Gwyn Hall, Neath, on Wednesday last. Mr. R. A. BROWNING, Assoc.M.Inst.C.E., of Neath, the President, occupied the chair.

REPORT AND ACCOUNTS.

The HON. SECRETARY (Mr. Octavius Thomas, of Pentre) submitted the report and balance-sheet. The report, which was of a gratifying nature, showed that there had been a steady increase in the membership. The May meeting had been held at Newport, and the September meeting at Swansea; the latter gathering being on the occasion of the Jubilee of Mr. Thornton Andrews, the veteran Manager of the Swansea Gas-Works. The accounts showed that the receipts during the past year were £24 3s., and the payments £18 15s.; leaving, with the balance brought forward, a sum of £7 9s. in the hands of the Treasurer.

The report and balance-sheet were adopted *nem. con.*

The following were elected officers for the ensuing year:—

President.—Mr. E. Jones, of Burslem (late of Pontypool).
Vice-President.—Mr. A. H. Brookman, of Tenby.
Members of Council.—Mr. D. Jones, of Dowlais, Mr. J. C. Pennington, of Colwyn Bay, and Mr. J. Parry, of Cardiff (in place of Mr. C. White, of Blaenavon).
Hon. Treasurer.—Mr. H. Morley, M.Inst.C.E., of Cardiff.
Hon. Secretary.—Mr. Octavius Thomas, of Pentre.
Hon. Auditors.—Mr. S. J. Acland, of Blaina, and Mr. J. M. Small, of Merthyr Vale.

NEW MEMBERS.

The roll of membership was increased by the addition of the following: Messrs. J. H. Silcox (Pontardawe), A. W. Branson (Caerphilly), W. Collin (Porthcawl), A. T. Kyle (Abergavenny), J. H. Dyer (Bridgend), and F. G. Brookman (Tenby).

DISCUSSION OF MR. WALTER LISTER'S PAPER ON "A DUST-PREVENTER FOR PUBLIC ROADS."

The members then proceeded to discuss a paper on "A Dust-Preventer for Public Roads," by Mr. Walter Lister, of Godalming, which, in the absence of the writer, was read at the last meeting by the Hon. Secretary. It may be recalled that the writer of the paper, which was given in our columns at the time,* pointed to the advantages of utilizing coal tar for public roads, and urged that the tar painting of highways had passed out of the region of demonstration and experiment. He expressed the opinion that all interested in gas-works would do well to bring the question to the front, as the method was certainly the most efficient and economical for dealing with the dust nuisance on a large scale. Its adoption would meet a long-felt want for the public, the pedestrian, and the cyclist, and would also provide a new and valuable market for coal tar.

Mr. A. H. BROOKMAN (Tenby), in opening the discussion, said the subject was one of the most important that could be considered by Associations of Gas Engineers and Managers, since it affected the selling price of tar. The question of how roads should be treated had been taken up largely by borough surveyors; and he would have been only too pleased if they had had with them at the meeting one or two of those who had had some practical experience of laying down tar. A variety of ways were proposed; but he thought the safest and soundest plan was to drive the tar into the road either by steam or atmospheric pressure. If it was merely laid on the surface, it was of little or no good. It must be sent at least 2 inches into the surface metalling. He had tried tar covering on a very small scale; and this was the result of his experience.

Mr. H. D. MADDEN (Cardiff) described some experiments which had come under his notice. The road selected was a very dusty one, 1½ miles in length, and was much exposed to the wind. They procured a water-cart and filled it with water that had come from the settling-tanks of the carburetted water-gas plant. On distillation, there was only about 5 per cent. of oily matter in it. However, it kept the dust down for ten days. Subsequently, they decided to try pure tar, which had only about 5 per cent. of water in it. The road was first of all well brushed, and then sprinkled slowly from a water-cart. He supposed the tar sank in 2 inches; but anyhow it kept the road clear of dust for two months. It was a matter of six or eight weeks before the work was done again. He believed their experiments were closely watched by the representatives of some of the local Councils.

Mr. J. M. SMALL (Merthyr Vale) said that the Borough Council of Merthyr had laid out 350 yards of road. They put down stones first, and then applied tar, and put pitch with it, sprinkled it with fine gravel on the top, and rolled it together. He visited the road the previous day, and the tar appeared to be working up in places. This was especially the case at the sides, where the traffic was heaviest; the reason, he supposed, being that the tar was not put on regularly. The only difficulty they experienced when laying it was that when rain came on they had to stop work. They had used 11 tons of tar on a piece of road 350 yards in length and 6 yards wide.

* See "JOURNAL," Vol. XCV., p. 698.

Mr. J. H. SILCOX (Pontardawe) said he did not wish to throw cold water on the members' hopes, but he had had some opportunity of watching what had been done in his town. There they had used a chemical preparation which they diluted with water. He had watched the roads closely; and he was bound to say he was afraid this preparation was a success. He did not know what its ingredients were; but he was told that there was no coal tar, or indeed any product from gas-works, in it. At all events, it had proved a great success on the roads in their district.

Mr. J. H. CANNING (Newport) said that in his town only very small experiments had so far been made. About the close of last summer the Borough Engineer painted a length of 200 to 250 yards of roadway with coal tar which was simply boiled. It was a much-used thoroughfare, being on the road to Cardiff. The dust was swept off before the application of the tar, which was put on with a brush. Unfortunately, they had a week's heavy rain immediately following. However, he had visited the spot the previous day, and had examined the piece of road; and though vehicles at either end of the stretch were raising large clouds of dust, he saw very little indeed on the piece which had been painted. There was no trace of tar visible on the surface, except on the extreme edges; and the wear upon the road surface was perceptibly less than it was over the portions immediately adjoining it at either end. He desired to emphasize the latter point, because the tar appeared to prevent wear of the roadway. The matter was, of course, one of the greatest moment to them all, especially in view of the extremely low price at present being offered for tar. As an instance of the importance of the matter, he mentioned that at Saffron Walden it was said that during the past twelve years the cost of the upkeep of the main roads had increased from £12 to £100 per mile, and the district roads from £8 to £30 per mile; while at Camberley it had been stated that before motor traffic was introduced the repairs to the main roads cost about £15 per mile per annum, whereas now they cost £200. In view of these facts, it seemed to him that there was a big opening for the tar-painting of roads, and making them with tar metalling. It certainly added to their durability; this appeared to be the general opinion. The last speaker had referred to the application of a chemical solution to the roads in the Pontardawe district for the prevention of dust; but he (Mr. Canning) would remind them that such preparations did not deal with the whole question. There was the durability to be considered; and unless chemical preparations assisted durability, they could not compete with coal tar, which undoubtedly added to the life of the road surface. He could speak strongly as to the penetrative qualities of water-gas tar; it went into all known substances, and he had known it go through 5 or 6 feet of puddle. On account of this quality, it would penetrate more deeply into the surface of a road than ordinary coal tar.

Mr. D. M. JENKINS, the Borough Surveyor of Neath, who was present by invitation of the President, said they had carried out many experiments in the town. He contended that the efficacy of tar-painting depended entirely upon the penetration. They must not be content with getting the tar on to the surface, but must convert the upper crust of the road into tar macadam. This was the only way in which they could hope to be successful. At Neath they had done 20,000 superficial yards last year; and there was no doubt whatever that the process had been an unqualified success. They had found that limestone absorbed tar to a much greater extent than granite. In using limestone, they found that the tar had penetrated 1¼ to 1½ inches, and that the surface crust was properly converted into a true tar macadam. On granite metalled roads, he found that the penetration was only to a depth of about ¾ inch; and this meant that two or three coats would be necessary on granite, against one on limestone. His conclusions were that on roads used for light traffic—limestone roads—one coat was enough for one season, or possibly for two. The cost of the tar worked out at about ¾d. per superficial yard. With regard to tar-spraying machines, he had seen the "Tarspra" Company's machine at work, and he thought it gave much better results than mere hand painting; but, of course, they must all remember that the whole thing was as yet only in an experimental stage. At Neath, the Streets Committee recently recommended the Town Council to have a length of road sprayed by machine. The object of the use of tar, as had been pointed out, was not merely the laying of dust for the time being, but the preservation of the material of the road, for the dust arose from wear and disintegration. His experience of the chemical solutions to which reference had been made was that they performed their functions for perhaps a week or ten days, and then the dose had to be repeated; but while with one or two they had obtained very fair results, they were not to be compared with those attained by the use of tar. Councils and other urban authorities would, therefore, be well advised to pay the extra cost of tar. At Neath, they had decided to tar a large number of roads in the borough next season. He attended the recent conference of Municipal Road Engineers and Surveyors at Olympia, at which the whole subject was discussed; and there was a consensus of opinion that tar-painting was the best solution of the problem of the prevention of dust and the better preservation of roads. One speaker on the occasion referred to, asked if the supply of tar would be sufficient, if the system were generally adopted. Perhaps some gentleman present might be able to throw light upon this subject,

as it was a serious question if the local authorities were to be hampered by want of tar.

Mr. Octavius Thomas (Pentre) said he visited Porthcawl last summer, and all the principal roads there had been tar-painted; and there was an entire absence of dust, despite the fact that it was a very windy place. After rain, the roads dried very quickly, because the water ran off instead of soaking in. Mr. Jenkins had referred to the question of the supply of tar. It had been estimated by the "Journal of Gas Lighting" that, in the event of the general adoption of tar-painting, 80 million gallons of tar might be required for the main roads. He understood that the output from gas-works was about 160 million gallons; and this did not include that which came from other sources.* They must emphasize the fact that the life of a road was undoubtedly prolonged by the use of tar. One gentleman had recently stated that it increased it by 100 per cent. Then they should look at the saving. There was no expenditure for scraping or surfacing the road, or taking mud away. Again, road watering was a big item, and was computed to cost something like 2s. or 2s. 6d. a mile. If they put this down for 100 days per annum, it would work out at a saving in street watering of about £12 10s. per mile. Tar-painting had been very largely adopted in France, where much of it was done by the Lassailly machine. This really consisted of two machines, in one of which the tar was heated and put into a circular boiler attached to the spreader drawn by horses. There was a sweeper underneath; and, finally, the tar was brushed in as the machine went along. It was claimed that this machine could do some 2000 superficial yards per hour.

Mr. J. Robb (Chepstow) referred to a firm who for a number of years had been making tar macadam for footpaths, and who were now taking up the stone question for roads. The stone was slightly broken, and the tar was heated sufficiently to drive out all moisture, and was sprinkled on to the stone while hot, and mixed thoroughly. Such a layer, to be properly effective, must be 4 inches thick.

The President said he thought the members could congratulate themselves that they had done their duty in thoroughly discussing the most important question raised by the paper; and if the use of tar was going to become universal, this bye-product from gas manufacture would do something to relieve suffering humanity. While it was their duty to look after their own interests, it was also the duty of surveyors to take the subject into earnest consideration. The increased demand for tar would greatly benefit gas undertakings. Many years ago, as assistant under his father at Plymouth, they went in for tar macadam in their works; and on one occasion he, with the Surveyor of Plymouth, laid a lot of tar paving on the Hoe, where it had remained for many years, and had turned out very well. Now Neath was making a start in the same direction. The remarks of the Borough Engineer had been most practical; and the experiments he made last year were highly successful, for the roads were now as good as they were when first made. Of course, there were several different methods; but what they were most concerned about was the raising of the price of tar in South Wales. Gas managers and engineers were at present greatly handicapped by the prices of their residual products—such as coke, tar, and sulphate of ammonia—being low; and if the demand for tar would increase its price, it would benefit them, although they did not want to see people asking a prohibitive figure. The low prices of residuals in South Wales was a point that should be taken into consideration in making comparisons with other parts of the country.

Mr. G. Mayne (Penrhiwceiber) read a paper on

USING AIR TO REVIVIFY OXIDE "IN SITU."

The subject of this paper is the method I have adopted in using oxide of iron in the purification of the gas made at Penrhiwceiber, admitting a proportion of air to revivify the oxide *in situ*. There is, of course, nothing new in the use of air for this purpose; but the method in which it is applied is, I think, not usual.

I started to admit air at the inlet of the exhauster on May 1, 1905, at which time we were having a new Weck valve fitted to our four purifiers. During the alterations to the pipes, &c., we had the catch-box only in use. This is a purifier 15 feet by 25 feet deep, with five rows of grids; and it would no doubt have been able to deal with the gas we were then making. But to prolong its efficiency, I decided to admit a proportion of air. I fixed an ordinary 20-light dry meter in the exhauster-house, with the outlet connected to the inlet gas-main of the exhauster with a 1-inch pipe, having a 1-inch cock on it, near the meter, so that it could be shut off at any time, and also a 1-inch cock on the inlet of the meter. This cock I use to regulate the quantity of air admitted.

The meter worked satisfactorily for only a fortnight, and then became stationary, and would not pass air. I changed the meter, and the new one worked all right for two months, and then stuck. I noticed some tar in the outlet meter-union; and on inspecting the valve-chamber of the meter I found the valves stuck quite fast with a very stiff tarry substance, which had no doubt got there through the exhauster having allowed back-pressure, due probably to lack of steam.

I then had a hydraulic seal made, on the principle of the hydraulic main, out of galvanized iron, 12 inches square by 8 inches deep, with a glass front, so that the water-line and the dip-pipe could be seen; and this I placed between the meter and the gas-main. The dip-pipe is 1 inch, which allows for a very light seal—being sufficient to check any ordinary back-pressure likely to occur. I have since had no further trouble in this direction.

I was surprised to find that, with only 1 per cent. of air, the illuminating power of the gas dropped quite perceptibly; and not being satisfied that so small a quantity of air could make such a marked difference, I had a look round the plant preceding the exhauster. I then found that the trouble was caused by air getting up the ascension-pipes of a bed of retorts that was out of action. There are three beds of retorts, all connected to the same hydraulic main. I was using two of these—the other having been only just let down; and I discovered that the hydraulic was 1¼ inches out of the level (being highest at the bed that was let down). I blocked up the ascension-pipes with a piece of brick and fireclay; but the clay cracked as it dried, and was not tight. I then removed the cap from the top of the ascension-pipes, and put in about half-a-shovelful of fliers (dust off the retort-benches); and on top of this was poured about a quart of tar down each pipe. This, I find, makes an air-tight plug, and is easily removed when the retorts are wanted.

The new valve was finished and put into action on June 1, 1905; the four purifiers, each 10 feet by 10 feet by 5 feet deep, being charged with two layers of oxide of iron 1 ft. 6 in. deep. This oxide was the same as had been in use the previous year, and had been exposed and turned during the seventeen days the valve was being fixed. I found that admitting 1½ per cent. of air increased the usefulness of the oxide considerably, working the purifiers in the usual way—that is, putting the clean purifier last in the series. But it occurred to me that if I put the clean one first the sulphuretted hydrogen would be taken out in the first purifier, and the greater part of the oxygen in the air admitted would be going forward and cleaning the oxide in the second and following purifiers. I tried this method, and found that it was very successful. I put a clean purifier on in front of one that was showing a foul test (the test paper being of a light brown), and continued to use them in this order till the purifier last put on showed that sulphuretted hydrogen was passing forward. I then put on the second purifier as first, to try the effect, and found that it did not pass any sulphuretted hydrogen for eight days, when the first discolouring of the test-paper was noticed, although this very purifier had shown a distinct indication that sulphuretted hydrogen was passing, by the test-paper being a light brown, as previously stated.

I have since adopted this system of working my purifiers with very satisfactory results. In May, 1906, I had a new lot of oxide (Dutch bog ore), and charged all four purifiers with the new material; so that the method has had a fair trial since then. When the first purifier in the series shows a foul test-paper, I put the last first, and the one that was first becomes second. This I find necessary about every fortnight in the summer, and every week during winter. This worked well without changing a purifier from May 5 to Sept. 14, 1906 (132 days). Then one of the purifiers caused a pressure of 3 inches; so I changed the oxide, which I found caked together on the bottom layer, very dry and solid. It had been the first purifier for eight days and was foul, but would undoubtedly have revivified had the pressure allowed me to alter the rotation. After a further nineteen days I had to change another, owing to the pressure thrown being 3·5 inches; and fifteen days later the third threw a pressure of 3·5 inches, and ten days afterwards the remaining purifier of the original charge. This last one had been in use 176 days; being changed on Oct. 30, 1906.

During the year I have found it necessary to empty twenty-three purifiers. In every case it has been a question of pressure caused by those purifiers, due, in a great measure, I believe, to the expansion of the oxide while revivifying, thus becoming more compact, and so causing the extra pressure. The number of times it has been necessary to alter the rotation during the twelve months has been thirty. The catch box has not been changed since August, 1906. It had been working previously from June 1, 1905, and was quite clean when emptied. At the present time, to the best of my belief, it is as clean as when last charged; so I do not see any necessity for emptying it for some time to come.

The cost of emptying the purifiers, turning the oxide, and all labour chargeable to purification for the past three years, and the make of gas for each year, have been as follows:—

	£	s.	d.	Gas Made.
Year ending March 31, 1905.	50	8	0	37,822,900 cubic feet
,, ,, 1906.	49	4	0	41,715,500 ,,
,, ,, 1907.	32	5	9	42,976,000 ,,

I think these figures are certainly in favour of the method I have adopted, as during the year 1907 the cost of emptying the four purifiers and charging them with the new oxide is included in the above figures. During 1907 I used no lime; while in 1906 the cost of lime was £11 14s. 5d., and in 1905 the lime used cost £39 11s. 1d. I have not mentioned the cost of the oxide, as this, when spent, will have a market-value nearly approaching its first cost.

Discussion.

Mr. A. H. Brookman (Tenby) congratulated Mr. Mayne upon his paper, especially if he had found some means of prolonging the

* Mr. Thomas read an extract from the editorial on the subject in the "Journal" last week, p. 286.

usefulness of purifiers, and avoiding the necessity of frequently discharging them. Not only managers but those living in the vicinity of gas-works would agree that if there was one nuisance worse than another, it was the opening and emptying of purifiers. He took it that Mr. Mayne had a catch-box, which was, of course, a safeguard, or else it occurred to him that in putting a clean box first and another last he would hardly be able to avoid having foul gas going forward to the holder. It struck him that 23 purifiers for the year was a large number for the quantity of gas made, as it averaged only about 2 million cubic feet per box. He found that with the assistance of atmospheric air he could easily get 10 millions per box without changing. His total was not quite so large, but the boxes were about the same size as Mr. Mayne's. He must, however, congratulate the author upon being able to purify gas at the rate of ¼d. per 1000 cubic feet. This seemed to leave very little more to be desired, unless they could go further, and actually make a profit out of it.

Mr. J. H. CANNING (Newport) expressed the view that the paper had been a practical one, inasmuch as it contained a record of facts. Was it absolutely necessary to change the purifiers at so low a back-pressure as 3 inches?

Mr. H. D. MADDEN (Cardiff) asked if the author of the paper thought the oxygen slipped past the first box and revivified the oxygen in the second, as it was difficult to think that any oxygen could get through. He thought the reason of the contents of the purifier becoming revivified was because it had rest. It was a well-known fact that some purifiers seemed to have recovered on a Monday morning, after the Sunday rest.

The PRESIDENT added his congratulations to Mr. Mayne.

Mr. MAYNE, in reply, said Mr. Brookman had asked whether he had a catch-box. He had one which was being used while the valve was being fixed to the four purifiers; and it was as clean now as it was directly after it had been put on. As to the quantity of gas purified without a change of box, his experiments had resulted as follows: No. 1, 10,051,000 cubic feet; No. 2, 12,141,000 cubic feet; No. 3, 14,034,000 cubic feet; and No. 4, 15,767,000 cubic feet. Replying to Mr. Canning, he said that 3 inches was a low pressure at which to change the purifiers. This was not sufficient; and the reason he changed at 3 inches was because he found a pressure of 9½ inches. He allowed 6 inches for the other plant; and he would certainly rather empty the purifier than have it blowing. Referring to Mr. Madden's remarks, he thought the oxygen slipped past the first box and revivified the oxide in the second. His opinion was that oxygen was not very active in the presence of sulphuretted hydrogen; but the latter was taken out in the first box, and the oxygen went forward to the second.

CONCLUDING BUSINESS.

On the motion of Mr. BROOKMAN, hearty votes of thanks were accorded the readers of the papers.

The HON. SECRETARY said that the Council had been considering the place for holding the next half-yearly meeting; and seeing that the Institution was for the whole of Wales, it had been decided to recommend that it should be Shrewsbury.

The recommendation was adopted *nem. con.*

On the motion of Mr. G. T. ANDREWS, hearty thanks were accorded to the Mayor and Corporation of Neath for the use of Gwyn Hall; and the proceedings closed with votes of thanks to the President.

Subsequently, Mr. Browning entertained the members to luncheon at the Castle Hotel, and was honoured by the presence of the Mayor and the Chairman of the Gas Committee (Mr. Hopkins Jones) as his guests.

During the afternoon a visit was paid to the gas-works—chiefly with the object of inspecting the work done by the De Brouwer charging machine, which has been in successful operation at Neath for some two years and more, and of which an illustrated account appeared in the "JOURNAL" for March 7, 1905.

The subject of the phosphorescence of rare earths was dealt with by MM. J. de Kowalski and C. Garnier, in a recent number of the "Comptes Rendus." To the nitrate of calcium or strontium is added a weak solution of the nitrate of the rare earth (praseodymium, neodymium, erbium, or samarium); the whole precipitated as carbonate; and the latter heated to a red heat with sulphur. The proportions of rare earth giving a maximum phosphorescence were determined in each case.

At a recent meeting of the Congleton Town Council, the Gas Committee reported that the question of making an increase in the salary of the Gas Manager (Mr. J. Smith), which had been referred back by the Council to the Committee, had been further considered, and it was ultimately resolved that the salary should be increased to £200 per annum as from April 1, and afterwards raised by annual increments of £10 to £250; also that an *honorarium* of £50 should be granted to him in consideration of the special work connected with the improvements and extensions to the gas-works already completed and at present in progress. When the Committee's minutes were submitted for approval, a desire was expressed on the part of certain members to have the question again referred back; but eventually, in view of the high terms in which Mr. Smith's services were referred to, the minutes were confirmed. It was pointed out that the gift of £50 was in recognition of work which would have cost the ratepayers £1000 if an expert had been called in.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

A Successful Conversazione.

There must have been an attendance of at least two hundred last Saturday evening at the *conversazione* to which the members of the Association, patrons, and friends had been invited, and which took place in the large hall at the Cripplegate Institute, Golden Lane; and the success of the function reflects great credit upon the organizers.

The hall had been, for the evening, transformed into a really interesting gas exhibition, in which were to be seen (many of them in operation) all sorts of appliances and scientific apparatus used in connection with the industry. This feature alone was more than sufficient to occupy the attention of those who were present; but there were other attractions likewise. During the evening some interesting speeches were delivered by patrons of the Association; and a report is given of these below, in order that the members of the organization and other juniors may have an opportunity of considering carefully the advice which they contain. Then there were some songs under the direction of Mr. L. F. Tooth; while last, but by no means least, there was a well-merited presentation (which is also noticed among the speeches) of a handsome silver fruit-dish to Mr. Walter Grafton, the former President of the Association. While the mind was so amply catered for, the bodily needs of the visitors were not forgotten; light refreshments being dispensed during the evening.

The space at disposal does not permit of anything like a detailed description of the numerous exhibits; but brief mention may be made of the result of our inspection—with apologies to any contributor who may have been accidentally overlooked, owing to the very full character of the programme. Taking the stands as nearly as possible in their order, attention first fell upon a model of Kew's self-closing retort-lid, which operates in an extremely simple manner, and at the same time seems as though it ought to be effective in actual working. Mr. Walter Grafton showed his new burner; and Messrs. Chesterton, Jones, and Co. had a good display of gas-fires and fittings. Next came a stand on which Mr. E. W. Eldred, Inspector of Public Lighting, and a member of the Association, exhibited various lighting and extinguishing appliances—Rostin, Alder and Mackay, Horstmann, and "Leid." There was also to be seen an improved form of inverted burner street-lamp, named the "Garel," which was shown by Mr. William Edgar, and embodies some special features as to light distribution suggested by Mr. Eldred, which tend to give the light a wider range than has hitherto been obtained by this type of lamp. It is made for two burners—either two 1¾ or 2 cubic feet, or two 3½ cubic feet—and can be fitted to the present incandescent street lanterns.

On the same stand, Mr. H. W. Harris, another member of the Association, showed his patent automatic clockwork gas lighting and extinguishing apparatus, of which there were some six models exhibited. In this apparatus there is no delicate or complicated mechanism to get out of order. It is quite simple and reliable; and while it occupies a small compass, it is powerful and accurate, and complete in every way. It is easy to adjust to the required periods for turning the gas "on" and "off," which it does at the exact predetermined time. When a large number of the apparatus are in use at one time in the streets, the lamps will all light up within three minutes of each other; and each apparatus will operate the plug of the gas-cock in a few seconds. When wound up once a week, it only takes the attendant two or three seconds to adjust the apparatus to the predetermined time that may be required for the following week; and the winding and adjustment can be done when the lamps are cleaned. The mechanism keeps to within three minutes of correct time during the week, and can be adjusted to operate the gas-cock instantaneously or as slowly as may be required. The apparatus is made absolutely damp and dust proof by means of a patented device. Several of the appliances have been in use in the London streets and in the Provinces for some time, and are said to have worked very satisfactorily; and though exposed continuously for a long time, and to the severe weather of three winters, the internal mechanism is in as good condition as when first fixed up. One of these was exhibited, and it showed by the discoloration of the casing the severe test to which it had been exposed; but, notwithstanding this, the internal mechanism was still bright and clean. Several modifications of the apparatus to meet various requirements were on view, and were very compact and of a neat appearance. The apparatus is claimed to be suitable for use with any form of street-lamps; and the gas-cock can be actuated by hand independently of the clockwork apparatus. Two of the models on view were adapted to Mr. Carpenter's lamp-base and flash-light. At the same spot, there was to be seen Mr. F. Ainsworth's "Two-in-One" gas-fire tap for any pressure.

Other exhibits were: Messrs. J. & W. B. Smith, fittings, mantles, &c. The Uno Company, coffee roaster. Mr. S. S. Field (of Ordnance Wharf), South Metropolitan tar products. Mr. H. Austin, of the South Metropolitan Company, lent a microscope with an interesting series of slides containing monazite sand and portions of different mantles in various states of preservation. Messrs. Thomas Glover and Co., model of a prepayment meter. The Pneumatic Gas Lighting Company, gas switch. Messrs. Bland

and Co., inverted burners. Messrs. Anderson, Duffield, and Co., inverted burner outside lamps, and their new pattern self-intensifying lamp. Messrs. Ready and Son, of Birmingham, heavy-made gas-cocks, &c. Messrs. Wilsons and Mathieson, water-heater. Messrs. George Waller and Son, gas-engine and exhauster model. Messrs. William Sugg and Co., gas-engine and compressor in action serving high-pressure lamps; photometers in action; and gauges and various other apparatus. Messrs. George Glover and Co., meters. Messrs. George Newton, Limited, cocks. The Richmond Gas Stove and Meter Company, "Bain Marie" stove for hotels and railway buffets; and gas-fires and water-heaters. The James Keith and Blackman Company, compressor in action, with high-pressure gas-lamps. Messrs. Clark Harrison and Co., apparatus for drilling mains under pressure. The "Khoma" Gas Arc Lamp, Limited, "Khoma" lamps lighting the hall.

Messrs. S. Fenlon and Son exhibited their "Unique" radiator for gas or oil. Messrs. Fletcher, Russell, and Co., laboratory apparatus, &c.; and a gas-furnace in action, in connection with which was shown the Féry radiation pyrometer, loaned by the Cambridge Scientific Instrument Company. The Economic Gas Cooker Company, cooker giving a constant supply of hot water. Messrs. Parkinson and W. & B. Cowan, meters and governors. The British Mannesmann Tube Company, tubes. Messrs. Biggs, Wall, and Co., tools for gas-works use; and drilling machine. Mr. William Edgar, the "Blenheim" fire. Messrs. Townson and Mercer, chemical and scientific apparatus. Messrs. Thorp and Marsh's cycle recorder for water gas; discount meter; and portable register. Messrs. J. J. Griffin and Son, the "Boys" calorimeter for determining the calorific value of gas. The Lead Wool Company, hydraulic tester in action, to demonstrate the value of lead wool joints. Messrs. George Bray and Co., burners. Maughan geysers; and Messrs. J. W. & C. J. Phillips, the Bristol recording pressure-gauge. Other exhibitors of models and machinery were Messrs. W. C. Holmes and Co., the Bryan Donkin Company, and the Sturtevant Engineering Company.

The President (Mr. W. Upton) exhibited the Nürnberg system of high-power lighting, which consists of pure oxygen and coal gas. The oxygen is made from liquid air by fractional distillation; and it is claimed by the inventor that with his apparatus he is able to put it into the holder at 1s. 6d. per 1000 cubic feet. The burner shown was a 1000-candle power one, with a consumption of 10 cubic feet of coal gas. The Hon. Secretary (Mr. J. G. Clark) was busy explaining chemical matters to the visitors; in fact, the organizers did everything in their power for the comfort of the visitors. The great services rendered in fitting up the exhibits and laying on the gas by Mr. Rothwell and Mr. Smithers were deservedly acknowledged by the President; and this reminds us that mention should be made of Mr. Smithers' illuminating device (which was shown in action), giving alternately an atmospheric and white flame, actuated by water pressure.

The PRESIDENT (Mr. W. Upton), in welcoming the members and visitors, remarked that the Association existed for the interchange of ideas; and it was hoped that in this way some benefit would be obtained by the members. It was only by the constant interchange of ideas with each other that he thought the best results could be obtained. If any of those present saw or heard anything in the hall that was of value to them, they should take it to heart, and think it over. Thought was very imperative, if the industry was to retain its position in spite of the active competition of other illuminants. He had received the following telegram: "The Council of the Manchester Juniors send hearty wishes for successful gathering. We hope to see conference of all Junior Gas Councils in the near future." It was well to receive such a message from a fellow Association; and it was well that the members of the London Junior Association should ponder upon what was underlying these words. Of course, their Association must stand on its own bottom—that was to say, the members must work out their own salvation. The Association was formed; but it could only exist so long as the members took a real active interest in it, and the possible conference to which this telegram alluded could only come about by the same active interest. Therefore there was work to be done; and as they did nothing in this world quite for nothing, it might be that by this Association they would obtain benefits, if in no other direction than mental development—which was a thing much to be desired in the industry. He would ask Mr. Helps if he would say a few words. They were juniors and had much to learn from the seniors.

Mr. J. W. HELPS said he very heartily esteemed the honour that had been done him, not only in inviting him there, but also in asking him to speak. He had been agreeably surprised in coming there, because he had not thought that the *conversazione* would take such a practical form as it had done; and he felt confident, from what the President had said, that everything would appeal to them most thoroughly, and provide much food for thought when they got home. He was very glad to come and show his hearty appreciation of the efforts of the Society. Sometimes, when looking back over the past thirty years, he wondered how it was possible that gas people could make their business pay, when a comparison was made with the conditions which existed then. When they considered that perhaps they used to get for their residuals more than the price paid for the coal; that the cost of their purification was (as he remembered it in the North of England) a minus quantity; and the depreciation in many other ways that had taken place—he wondered how it was they could make things pay. He thought it was probably because of the different state of affairs that existed among, not only those who were in charge of works, but those who were occupying positions of not quite such great importance. In other words, it was due to the great spirit of education which had been spreading through England during the past few years. He did not want to depreciate the efforts of the pioneers of the industry in the old days; but he thought if they had continued on the old lines, the industry would not be in the position it now occupied. When he spoke of education, he did not only allude to the form that took place in the splendid technical schools and polytechnics that had grown up of late. It was very useful; and they ought to be extremely thankful that this form of education was brought to their doors, and cost so little. But this was not all. They had often heard that at schools one only learnt how to learn; and this was a fact that they all needed to appreciate, because it seemed to him the true education of a man really began when he decided on the branch of work he was going to take up, and began to apply himself in that particular direction. He learnt to throw aside, for future use occasionally, a good deal of what he had gathered in his younger days; to sift the chaff from the grain, and to use the grain to the best advantage. One important aid in this special education was the meeting together of those who were working in the same cause. The old British Association of Gas Engineers and Managers was responsible, he thought, practically for starting this sort of thing, though there was a body in Scotland that claimed priority; and next they had the District Associations, and now the Junior Associations. The more they met and talked over matters and examined apparatus—taking careful note of everything—the better would it be, not only for themselves, but for the great industry they represented. He congratulated them on the efforts they were making in this direction. There appeared to be a spirit of freemasonry in their industry; and this was a great advantage. It seemed to him that the first thought a gas manager had, when he had found out something that benefited his own undertaking, was to let others have the benefit of it also; and to this spirit he believed they owed a great deal of the success the industry had attained, and would, he felt sure, continue to enjoy. The Association were also to be congratulated upon their President and the remarks he had made. He (Mr. Helps) had already had the pleasure of welcoming the Association to his own works at Croydon; and if there was anything else he could do to assist them in any possible manner, they had only to command him.

Mr. A. F. BROWNE, on being called upon by the President, said it was a great pleasure for him to be there; and first of all he had to thank them for the honour that had been done him in asking him to become a patron of the Association. The list of patrons included not a few of the leading names in the gas world; and if he were a member of the Association, this would be a source of gratification to him, for two reasons. It was proof positive that, in the opinions of those best qualified to judge, this and kindred Associations deserved encouragement; and they might fairly infer that, in lending their names, these gentlemen also expressed their willingness to further the objects in view by all the means which might be in their power. What called this and other Junior Associations into existence, and what were the ends for which they existed? There was no doubt whatever that the want of something of the kind had been long felt; and it was within the recollection of all of them that there came a time when the Technical Press of the industry took up the cause, with the cry, "Sons of the Industry, Wake Up!" [These articles appeared in the pages of the "JOURNAL" for 1902.] He really traced the origin of the Junior Associations to this step on the part of the Technical Press of the industry, which he was sure every man who was getting his living in connection with gas manufacture and supply had every reason to admire and feel grateful for. But the Technical Press had done much more for the Junior Associations than this. It constantly gave them bold advertisement by reporting their proceedings just as freely as it did those of the other Associations. In other words, the Press took them seriously—a fact from which they might derive the greatest encouragement. The members of the Association had banded themselves together with the object of helping each other to obtain that knowledge which they felt necessary to enable them, as individuals, to do good work, and raise themselves, from the worldly point of view, and get as good a living as possible out of the industry. They could not have a more legitimate ambition or a better means of carrying out that object. He felt confident that every member who conscientiously endeavoured to do his part to further the aims of the Association would be amply rewarded. He would like to give them one word of advice. If they wanted to know something more about a subject, they should sit down and write a paper upon it; and they should take the greatest pains to convey their ideas in an intelligible form to those about them. This and the visiting of gas-works and factories producing apparatus used in the industry, would be of the greatest assistance to them. There was all the difference in the world between knowledge gained from text-books and that which a man secured by his own efforts. Practical knowledge was what they wanted; and it was in the direction of getting practical acquaintance with what went on in gas-works that those gentlemen whose names were on the list of patrons, and many others, could be of very great assistance. He felt fully justified in saying that, so far as the Company he had the honour to serve were concerned, from the Chairman himself (Sir George Livesey), from the Chief Engineer (Mr. Charles Carpenter), and from the Station Engineers and their staffs, the members of the Association would receive, upon those occasions when they thought proper to visit their works, the warmest welcome; and every effort would be made to render the visit both pleasurable and instructive. The South Metropolitan Company had long ago appreciated the worth of the enthusiasm of its servants. The officials fully understood the necessity of the members of their staff—and perhaps more than any of those members who came in contact with the general public—having full knowledge of the business they had to push. There was a great necessity for knowledge in the gas industry to-day—for new knowledge, of course. The industry lived not only by the use of old knowledge, but by the acquisition of new; and when the day came when there was no more knowledge forthcoming in the industry, retrogression would set in. But he believed they were far from that day. Those present were wise in associating themselves with the gas industry. He thought there was much more chance of them achieving a competence in gas than in electricity. He believed they were on the verge of new developments in gas manufacture and supply which would be almost revolutionary and epoch making. There was, he said, need for new knowledge; and it would be forthcoming. But, in addition, there was every necessity for the proper utilization of existing knowledge. His Company gave tangible inducements to

employees of all grades to do the best they could; and he was sure they would encourage the members of their staff to join the Association. Knowledge was power, and a priceless possession; but he would ask them to look upon it not so much as an end in itself, but as a means to an end—namely, the acquisition of further knowledge. The Junior Associations had come to stay. They would, as time went on, make their mark in the gas industry; and he wished them, both in their individual and corporate capacity, every success.

The PRESIDENT said that he had now a very pleasant duty to perform. The Association was formed in 1902; and the first four years were naturally the hardest. What they saw that day was the result of five years' work on the part of their former President, Mr. Walter Grafton, and the Council. A proposition had come from the members themselves that some notice should be taken of the labours of Mr. Grafton. The result was that he had to ask their former President's acceptance of a token of appreciation on the part of the members of the Association.

He then handed to Mr. Grafton a handsome silver fruit dish, bearing the following inscription:

> "Presented to Mr. Walter Grafton by the members of the London and Southern District Junior Gas Association on his retirement as President after four years' service, and as a mark of esteem and appreciation of his efforts in forming the Association."

Mr. GRAFTON said it was a pleasant surprise to receive recognition of work that had been done without any pressure. He considered it a small amount of work, which was done for the good of others, and of the industry which he had at heart. As to the need for practical knowledge, if they did not get a man to think theoretically, they could not get him to think practically. He thanked them very much indeed for their handsome present.

Mr. L. F. TOOTH said the *conversazione* was originally the idea of Mr. Upton; and he had planned the whole thing. They had much to thank their President for; and he asked him to accept the best wishes of the members for his good health, and their thanks for what he had done.

The PRESIDENT, acknowledging the vote, remarked that whatever slight credit might be due for the inception of the idea, without the aid of practical men it would have remained an idea. It spoke well for the Association that they had among them sufficiently practical men to convert the idea into such a result as they saw before them. He should like to couple the names of Mr. H. Rothwell and Mr. Smithers (who had carried out all the arrangements for the exhibition) with the vote of thanks.

Mr. W. J. LIBERTY proposed a hearty vote of thanks to the visitors and patrons who had been with them that evening. It was a remarkable fact that they should be holding that *conversazione* and exhibition, in the centenary of gas lighting, on the very spot in the very ward where gas lighting was first tried in the City of London in the public streets. Of course, he knew that on Jan. 28, 1807, gas was first seen in Piccadilly; but he had with him a document which was rather historic, and said that the City Commissioners of Sewers had had an offer to try an experiment of public lighting by gas in the streets, and that this would be carried out in Golden Lane, Cripplegate. It was dated July, 1807. He concluded by remarking that they wanted all the help and advice they could get from those who were not juniors in the profession.

Mr. ROTHWELL seconded the proposal, and, referring to the President's remarks, said the contributors of exhibits ought certainly to be thanked for their kindly co-operation.

Mr. W. H. Y. WEBBER, in returning thanks, complimented the Association on the successful gathering that night. Mr. Upton had asked him to say a few words to the juniors, and by this he took it were meant those who were not yet in responsible situations, but were looking forward to them as a reward for their work in the present. He had the deepest sympathy with the young men who had chosen gas as a profession. It was a profession which they all knew did not lead to anything very great; it was just a livelihood, but did not lead as a rule to fortune. But the position of a gas manager had materially improved since he became acquainted with the profession; and there were now, it might be some comfort to the younger men to know, a good many reasonably-paid appointments which they might hope to fill, though there were very few rich positions. One thing he would say to the young men was that they should have confidence in their future. Having chosen their profession, they should stick to it, and make up their minds to do the best they could. There was always plenty of room at the top; but in order to get there, a man must nowadays be a thoroughly good all-round man. It was no use specializing too early. There ought to be more circulation of employment among the younger men; and he would say distinctly, "Do not stay too long in one place." It was a vital error. They should not be always running about; but after a man had served his time in a gas-works, he ought to go into a contractor's yard, and learn something of that particular kind of work. Then he wished all young men would experiment as much as possible—learn things for themselves. There was too much tendency to magnify the importance of educational systems. They could show a man how to learn; but everything he knew he had to teach himself. There was a great deal to be learnt with simple, home-made appliances; and all young men should adopt this method of teaching themselves. Lastly, he would ask all men who entered the gas profession to make their general education as wide as possible. The gas manager should be a gentleman; and he must train himself in observation. Now these Junior Associations were covering the land, no one could say he had not an opportunity of getting himself known. By taking an active part in the proceedings, members had a chance which was not given to juniors in times gone by.

Sir Boverton Redwood has been nominated to the office of President of the Society of Chemical Industry, and Professor Percy Frankland, F.R.S., as one of the Vice-Presidents. These nominations will come up for confirmation at the annual meeting of the Society, which opens in Birmingham on July 10.

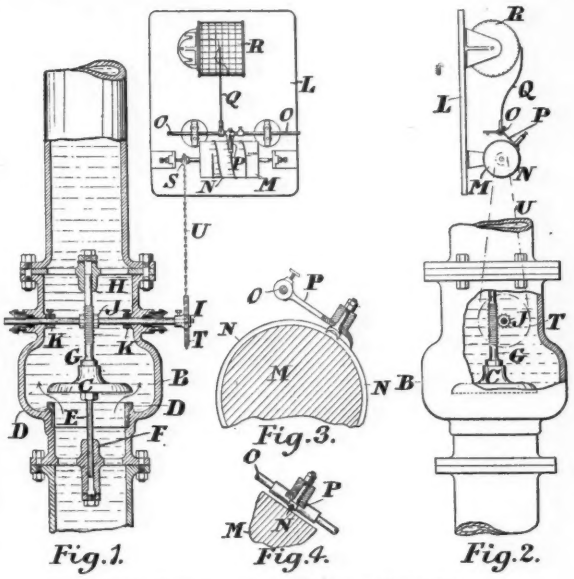
REGISTER OF PATENTS.

Measuring and Recording the Flow of Gases or Liquids.

LEA, J. E., of Manchester.

No. 6454; March 17, 1906.

This invention consists chiefly in the application of the motion-indicating or rectifying mechanism described in patent No. 3000 of 1905 to the measuring and recording of the rate of the flow of a gas or liquid when passing through a closed pipe, conduit, or the like, to which a float is not generally applicable. It also consists in the use of a valve, piston, or the like upon which the gas or liquid may act when passing through the pipe, and in the use of the movements of such valve or piston under variations in the pressures or rates of flow for operating the recording mechanism.



Lea's Flow Recorder applied to a Closed Pipe.

Fig. 1 is a front view, and fig. 2 a side view of the recording apparatus as applied to a closed pipe. Figs. 3 and 4 are details of the recording apparatus to an enlarged scale. Figs. 5 and 6 are front and side views of the apparatus as applied to the "Venturi" system of measuring the flow of gas or liquid flowing through a closed pipe.

In the chamber B is a valve C, which normally rests upon a renewable seating D. To the underside of the valve is connected a spindle E, which slidably fits the boss F of a cross-bridge formed in one with the lower part of the chamber B. To the upper side of the valve is connected a further spindle G, which, at its upper end, slidably fits the boss H of a detachable cross-bridge, held in position by its outer edge fitting between the pipe flanges and those of the chamber B.

Upon the spindle G are formed the teeth of a rack. In the boss F are small holes, and in the boss H are also small holes, whereby, as the valve C rises or falls, no vacuum can be formed behind the spindles, and any liquid or gas that may get behind them will not interfere with the action of the valve, but will tend to give it a steady movement—the small chambers behind the spindles acting as "dash pots."

Rotatably mounted in glands, and extending transversely across the chamber B, is the rotary spindle I, and in one with, or fastened upon, the spindle is a pinion J, the teeth of which mesh with the teeth on the spindle G. For holding the spindle against endwise movements, it is provided with adjustable collars K.

Mounted upon a support L, and in any suitable relationship to the pipe, is the recording apparatus described in the 1905 patent. It comprises a small rotary drum M, around which is wrapped a wire N, a sliding rod or bar O with arms P Q, and a clockwork driven recording drum R. The arm P, through a small saddle-shaped swivelling block, engages the wire N on the drum M, and the arm Q carries a pen by which a line is marked on the drum when motion is given to the rod. Fast upon the axis of the drum M is a small sprocket or chain wheel S, and fast upon the end of the spindle I, outside the chamber B, is a larger sprocket wheel T. Encircling the two wheels is an endless chain U. The manner of transmitting motion from the spindle to the axis of the drum will vary according to the necessities of each case.

With the several parts arranged as described, and a liquid or gas caused to flow through the pipe in the direction of the arrows, the valve C will rise from its seating and thereby cause a rotation of the spindle I and, consequently, a rotation of the drum M; and the pen will then mark the drum R.

The maximum lift of the valve C is preferably equal to one-fourth of the interior diameter of the pipe—this being sufficient for the full capacity. The weight of the valve and its spindles being constant in any position, the valve is supported by the difference in pressures above and below it; and this difference being a constant quantity, the volume of liquid or gas passed is approximately proportional to the lift of the valve. If, therefore, the wire N wrapped around the drum of the recording apparatus be set to a helix corresponding to a curve representing the rates of flow in relation to the movements of the valve C, the wire will serve, when the drum is rotated, to move the rod O and the pen at a rate directly proportional to the flow at any instant; and the

marking of the drum will enable the total quantity of liquid or gas passed through the pipe during any time to be computed.

In figs. 5 and 6, a closed pipe is shown through which flows the liquid or gas to be measured. W is the "Venturi" tube let into the length of the pipe, and X is the usual mercury-filled U-shaped tube, the limbs of which are connected to the "Venturi" tube as shown. As is well known, the difference in pressure at the two points A Z of junction when a liquid or gas is flowing through the tube W serves to depress the level of the mercury in one limb of the tube and raise it in the other—thus indicating, by the difference in levels, the rate of flow at any instant.

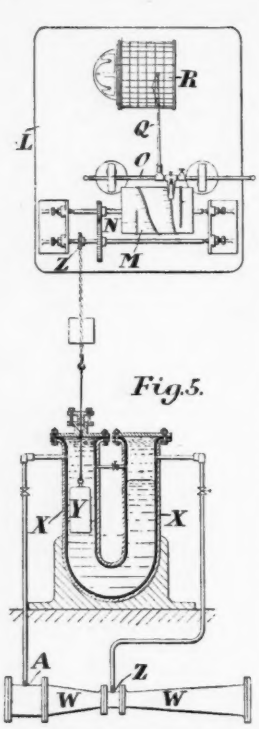


Fig. 5.

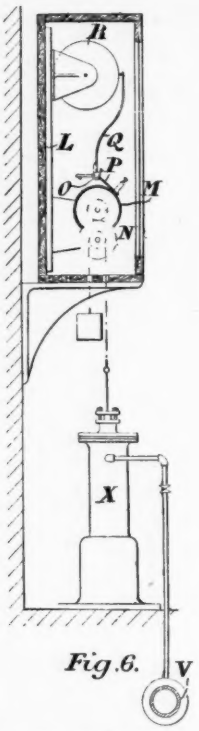


Fig. 6.

Lea's Flow Recorder attached to a "Venturi" Tube.

In combining the recording apparatus therewith, use is made of a float Y, placed in the tube X as shown, and of a brass wire, which at one end is connected to the float and at the other end passes through a gland packing in the tube end, and is connected to a cord or chain that passes over a sprocket-wheel Z, mounted upon an axis supplementary to that of the drum M. At its opposite end the chain or cord is connected to a balance weight. Upon the axis is also a large spur-wheel, while upon the axis of the drum M is a small spur-wheel—the two wheels meshing with each other, so that, when rotated, the velocity of the drum is increased for a given movement of the sprocket-wheel Z.

By the principle of the "Venturi" system, the volume of liquid or gas passed through the tube or pipes is proportional to the square root of the difference in the "head" or pressure between the points A and Z—*i.e.*, between the inlet and throat of the "Venturi" tube. This difference in head is measured by the mercury in the U-shaped tube X; and the movements of the float Y are, therefore, proportional to the difference in the head at the points A and Z. With, therefore, the wire N of the drum M set to a helix representing a curve which corresponds to the rates of flow in relation to the differences in pressure and movements of the float, and the drum caused to rotate by the movements of the float, the recording pen will be moved at a rate directly proportional to the rate of flow at any instant, and thus the area of the diagram produced upon the recording drum will represent the total volume passed during any period of time, which can be readily calculated by a planimeter.

Compressors for Lighting and Heating Plants.

SCOTT-SNELL, E., of Victoria Street, S.W.

No. 7956; April 2, 1906.

This invention, "for producing a flow of elastic fluid under pressure for lighting and heating purposes," is especially applicable to systems in which the gas or other fluid or the air required for combustion passes to the burners under pressure.

It has heretofore been proposed, the patentee points out, to supply gas or gas and air under pressure by injecting them by means of a steam-injector. The difficulties, however, in the practical working of such apparatus were that the condenser proposed was unsuitable for the present purpose; and no provision was made for keeping the pressure at a predetermined and constant value. The first difficulty was overcome by using suitable condensing apparatus adapted to make sure that the gas passing to the burners is quite free from moisture, and the second by connecting the feed water supply direct to the boiler operating the injector and allowing a slow feed into the boiler and a quick return from it automatically controlled by the boiler steam pressure without any mechanical movement of the valves. The further difficulty—that pressure might rise abnormally in the high-pressure service—was overcome by means of a suitable valve adapted to connect the high and low pressure mains on any abnormal pressure occurring in the former.

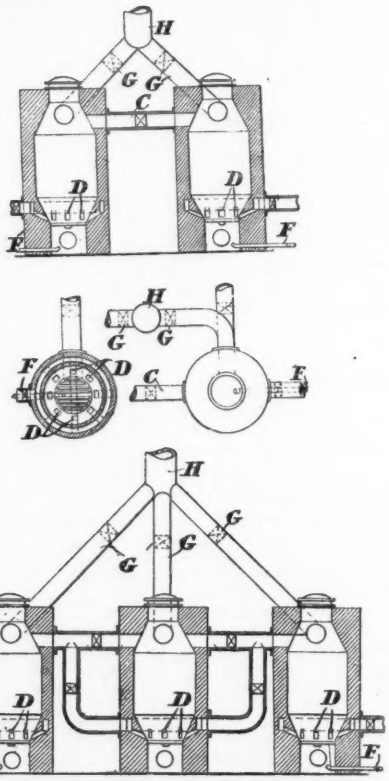
The object of the present invention therefore is: (1) To construct apparatus for compressing elastic fluid for lighting or heating purposes which will ensure a supply at a constant and predetermined pressure, which will be automatic in operation and not require attention after it is once started until it is shut down, and be efficient in relation to a lighting circuit—that is, it may be operated by a small burner. (2) The use of a specially-designed self-regulating steam-generator for producing a supply of elastic fluid under pressure for lighting purposes. (3) The combination in a pressure heating or lighting system of a steam-generator in which the pressure is automatically controlled and predetermined by the pressure in the water supply with elastic fluid compressing devices operated by the steam generated. (4) The combination with appliances for lighting and heating by means of compressed elastic fluid of a self-regulating steam-generator so arranged that a slow feed only of water to the boiler can take place, while a quick return is possible if rendered necessary by an abnormal rise of steam pressure.

Manufacture of Water Gas.

TERNEDEN, L. J., and MÜLLER, J. M., of the Haarlemmer Weg Gas-Works, Amsterdam.

No. 8154; April 4, 1906.

This invention relates to water-gas processes in which the blowing run is effected through two generators at the same time, while the gas run is effected through the generators in successive order—that is, in parallel for the blowing run and in series for the gas run. Also, in processes hitherto employed, the steam is conducted either through one gas producer or generator or through two—passing in the latter case through the first from below upwards, and through the second in the opposite direction, and being then carried off. A feature of the present invention is the arrangement of more than two generators in this manner—parallel in the blowing run and serially in the gas run. By thus increasing the number of generators, the quantity of carbonic acid is said to be considerably reduced, and the calorific value of the gas correspondingly increased.



Terneden and Müller's Arrangement of Water-Gas Plant.

There is a connecting pipe C between the generators, and openings D (for carrying off the water gas as formed) leading to a collecting channel, from which the gas is conveyed further. The passages may either be arranged in the masonry of the generator, or outside same. In this case, the openings run through the side of the generator to the collecting channel outside, and are provided with a water cooling device for preserving the pipe and slide valve.

When a number of generators are used, the action is as follows: In the case of two generators being employed, the steam inlets F, as well as the gas outlets K, and communication pipe C are closed during the blowing run; while the air inlets E and the exhaust gas outlets G are opened. During the gas run both air inlets, both gas outlets, one steam inlet, and one gas outlet are closed; while the second steam pipe, communication pipe C, and the second gas outlet are opened. The steam passes through the grate, flows (say) through the left-hand generator upwards from below, passes through the connecting pipe C and the other generator, and leaves it without coming in contact with the right-hand grate. After the generator has been blown hot again, the steam flows in the reverse direction.

When three generators are employed, only the air inlets and the

exhaust gas outlets leading to the chimney H are opened during the blowing run, while during the gas run the air inlets and gas outlets are closed.

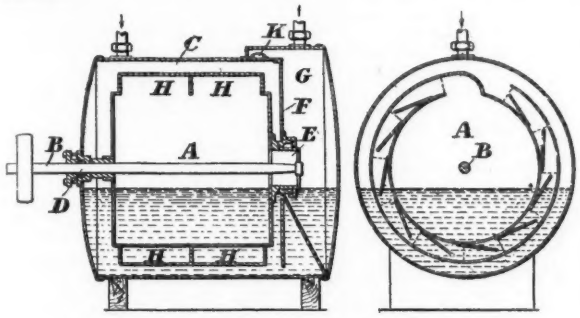
Compressing Coal Gas.

GORE, J., of Sutton, Surrey.

No. 8486; April 9, 1906.

This invention has for its object to enable the pressure of gas, "as delivered from the main, to be increased in the branch conduits, before and for the purposes of consumption."

The apparatus employed comprises a stationary chamber divided into compartments, one of which collects and contains gas from the main or other source of supply, while the other forms the compression chamber. In one of the said compartments is a receptacle capable of rotation upon a shaft mounted on hollow bearings, thereby forming a communication between the chambers. The rotary chamber is provided on its periphery with spiral or annular passages or pipes arranged so that the gas collected by the spiral passages, and trapped therein, is compressed by the pressure due to the head of liquid contained by the stationary chamber.



Gore's Gas-Compressor.

The rotary chamber A is mounted on a shaft B, supported at one end by the stationary chamber C, in a stuffing box D, and at the other by a hollow bearing E, preferably mounted in the partition F between C and the compression chamber G, and forming a communication between the rotary chamber and the compression chamber H. The spiral passages or conduits on the periphery of A form communications between it and the stationary chamber C.

As the chamber revolves, the gas is trapped in the passages H as the ends dip into oil; and as the rotation continues, the gas is caused to travel around the passages, and finally emerges into the interior of A. After leaving the passages, the gas escapes, through the hollow bearing E, into the compression chamber, whence it is drawn for consumption.

The liquid, which has been carried round with the gas, escapes through E, and returns to the stationary chamber C. The gas in the compression chamber is under the influence of pressure due to the depth or head of the liquid in the rotary chamber.

A non-return valve K is provided for use when the compression of the gas is not required; so that the gas can pass direct from the main to the outlet in the compression chamber G.

Photometers.

HARRISON, H. T., of Victoria Street, S.W.

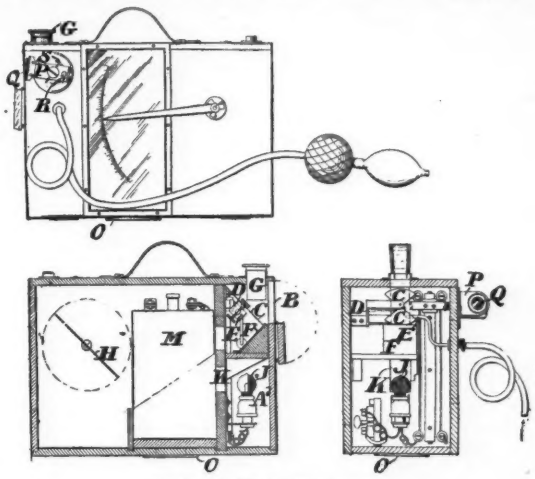
No. 11,052; May 11, 1906.

This invention relates to flicker photometers, in which surfaces illuminated alternately by the source of light to be measured and a standard lamp are brought alternately before the eye of the observer, "who can vary the degree of illumination of the standard lamp until both surfaces are equally illuminated, which can be readily ascertained by the disappearance of the flicker seen upon viewing the surfaces when the same are not equally illuminated." This type of photometer has, says the patentee, hitherto comprised a motor which rapidly rotates one or more shutters or surfaces specially shaped for the purpose, and which is fitted with a mechanical governor in order to vary the speed of rotation, and also to maintain the speed constant during the operation of balancing. Such apparatus, however, is not only costly, but it requires constant attention from the operator—"thus from time to time interfering with the making of the measurements." It is also heavy, and occupies considerable space; thus reducing the portability of the instrument for out-door use. The present invention, therefore, has for its object "to improve the construction of photometers of the type referred to, and to obviate the above-mentioned disadvantages."

In the preferred form shown, the photometer box has an opening B at one end for admitting the rays from the light to be measured, and to allow of their falling on the surface of a rotating device consisting of two opposite quarter-sectors C of a metal disc having a white surface —the other two opposite quarter-sectors being cut away. These sectors are mounted on a spindle pivoted at (say) 45° to the base of the box; the arrangement being such that the light admitted through the opening B will illuminate only one sector at a time as it rotates past the opening B. To the spindle are fixed a number of small radially arranged metallic vanes D, so as to form a paddle-wheel, adjacent to which, having its axis tangentially placed, is fixed a nozzle E, through which air can be forced so as to impinge upon the vanes and rotate the spindle and sectors of white carboard or sheet metal having a white upper surface. The air is supplied to the nozzle by india-rubber tubing, to which an ordinary valved bulb is attached; a valve may be provided in the air supply pipe or in the bulb and made adjustable to control the pressure of air.

Directly below the illuminated sector C is a mirror F, the reflecting surface of which is arranged at an angle of 90° to the surface of the sector and 45° to the axis of a vertical eye-piece or tube G inserted through the top of the photometer; the arrangement being such that, when the sectors are rotated, the mirror will be seen through the eye-piece alternately with each sector.

At the opposite end of, and within, the photometer is a movable screen H, having a reflecting surface like the sectors. It is attached to a horizontal spindle that passes through one side of the photometer box, and to the outer end of which is fixed a pointer arranged to be moved over a scale arranged so that, by turning the pointer and spindle, the angle of the surface of the screen to the horizontal can be easily varied.



Harrison's Flicker Photometer.

A standard lamp J is mounted in a separate compartment of the photometer below the mirror in such a way that the rays of light from it fall on the screen—as, for instance, by passing through an opening K in the partition. M represents one of two electric cells connected to the lamp and having included in circuit therewith a variable resistance.

If now the instrument be placed at a definite distance from the light to be measured, with the opening B towards the light, the sectors C, when rotated by forcing air on to the vanes D through the nozzle E, will be illuminated in turn when brought opposite the opening B, and will, at the same time, be in the field of view of the operator looking down the tube G. Then when each sector is turned into a position at one side of the opening so that it is not illuminated and is not in the line of sight, the operator will see the mirror F, in which will be an image of the screen H (or a part thereof) illuminated by the standard lamp J. If the surfaces of each sector and of the mirror be not equally illuminated, the bringing before the eye of unequally illuminated surfaces will cause the appearance of flicker. The operator can now, by turning the screen H about its axis, vary the degree of illumination of the screen by the standard lamp, owing to variation in the angle of incidence of light from the lamp on its surface; "the angular adjustment of the screen being made until there is no appearance of flicker on viewing the reflecting surfaces at which time such surfaces will be equally illuminated."

Having obtained this balance and noted the position of the pointer on the scale (which is divided into candle feet or other suitable units or factors), the candle power of the lamp being measured can be easily ascertained, the distance of the lamp from the photometer having been noted, and also the angle at which the light falls on the sectors. The latter datum may conveniently be ascertained, says the patentee, by means of the pivoted carrier P carrying a lens at Q adapted to project an image of the lamp being tested upon a surface R, which is engraved with a determining line. For each degree of variation of the angle at which the direction of light falling upon the sectors departs from the normal or perpendicular, as indicated by the pointer S, the result obtained is to be corrected by multiplying it by a corresponding constant.

Manufacture of Coal Gas and Water Gas.

BROWNE, A. F., of Vauxhall, S.E.

No. 11,099; May 11, 1906.

This invention, relating to the manufacture of gas from coal and other carbonaceous materials (liquid or solid), and also referring to the obtaining of a mixture of coal gas and water gas, is fully described and illustrated elsewhere to-day, p. 375.

Preventing Reflux in Water-Mains.

GARSIDE, F., of Prestatyn, and ELLINGTON, N. B., of Chester.

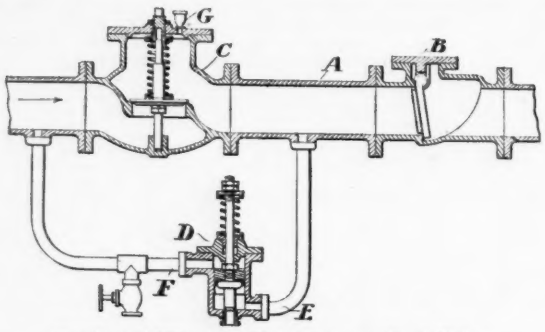
No. 13,022; June 5, 1906.

As is well known, it is usual, in order to prevent the return flow from branch service-pipes to water-supply mains, to interpose a back-pressure, check, or reflux valve; but since such valves cannot be made absolutely water-tight, a certain amount of leakage is inevitable should the pressure in the branch or its connections be greater than that of the main. It is the object of the present invention to prevent any return flow under any conditions of pressure.

For this purpose there is interposed between the branch and the main a hydraulic lock, consisting of a length of pipe having an ordinary check valve at its service-pipe end and another check valve at its supply-main end—the latter being loaded to open only when the main pressure exceeds that in the lock by more than a predetermined amount. The lock is provided with a relief valve loaded to discharge at a pressure less than that in the main by a definite amount.

The method of loading may be varied to suit circumstances. Thus it may be loaded by a spring either within or outside the valve casing, or it may be loaded by dead-weight applied either directly or through

the intervention of suitable levers. Consequently, the relief valve will discharge for all pressures of the lock in excess of that which produces this definite difference; and the pressure in the lock will be thereby reduced.



Garside and Ellington's Water-Pressure Check-Valve.

The illustration shows the preferred construction of apparatus in longitudinal section, with the check valve at the supply-main end of the lock loaded by a spring, and the relief valve fitted with a piston, as described. A is the water-lock chamber, B the ordinary check valve, C the loaded check valve, D the relief valve, E and F its connections to the lock and supply mains respectively, and G the air-snifting valve. In the check valve C are shown the valve disc, the loading spring, and the guide socket screwed through the cover of the valve to enable the compression of the spring, and consequently the load on the valve, to be adjusted to requirements. In the relief valve D, the piston is shown suitably packed, with the loading spring adjustable to the assigned difference of pressure between the lock and the supply main.

Measuring the Exposure of a Selenium Cell for Purposes of Photometry.

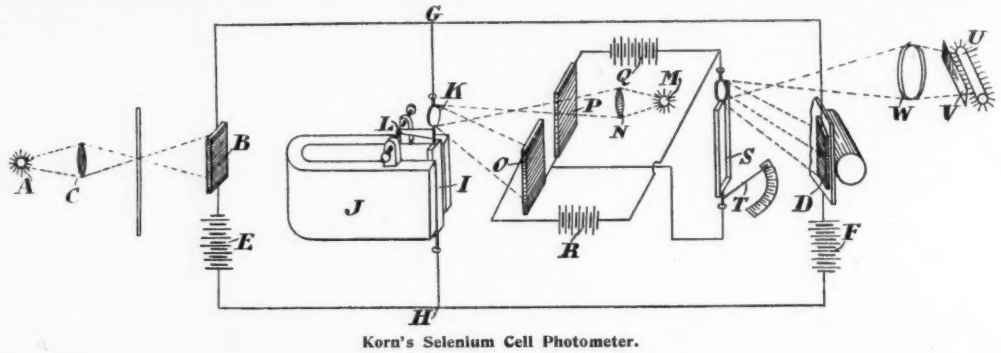
KORN, A., of Munich.

No. 16,343; July 19, 1906.

This invention consists in a new method of employing two separate Wheatstone bridges, each of which comprises two selenium cells and two working batteries, all connected in series, and a galvanometer in the bridge—the one selenium cell in the primary Wheatstone bridge being exposed to the action of a light, while the secondary Wheatstone bridge is placed under the control of the galvanometer in the primary Wheatstone bridge; the other selenium cell in the latter being placed under the control of the galvanometer of the secondary Wheatstone bridge.

This is illustrated in the diagram. A denotes some source of light, which can emit a pencil of rays of light in the direction towards a selenium B. These rays of light may be collected by a lens C, and are sent forward in a first converging and afterwards diverging pencil, and act upon the selenium cell for more or less reducing its resistance. [Of course, the selenium cell and the lens may be enclosed in a suitable "camera obscura," not shown.] The selenium cell is inserted in the same circuit as a second selenium cell D and as two storage batteries E and F. The two selenium cells are made as far as possible alike, and are placed on the same side of the two storage batteries. The circuit comprises lines for connecting the two selenium cells and the two storage batteries. A sensitive and rapidly acting galvanometer—for example, a Deprez-d'Arsonval's galvanometer—is shunted to the lines at G on the one hand, and at H on the other. It will be seen that the circuit forms the four arms of a primary Wheatstone bridge, in the bridge of which the galvanometer is inserted. The little frame I of the galvanometer is mounted to swing between the poles of the horse-shoe magnet J, and is provided with a mirror K and a light arm L. Adjusting screws are provided on the two legs of the magnet to act as stops for limiting the deflection of the arm. A lamp M has its rays of light collected by a lens N and sent forward in a pencil to the mirror, which (according to its position) reflects the rays of light on either of two selenium cells O P, or on both of them. The latter are made approximately alike, and are inserted in a second circuit, which comprises two batteries Q and R, made approximately alike and connected in series. To two opposite points of the circuit between the two selenium cells O and P on the one hand, and between the two batteries Q and R on the other, is shunted a galvanometer with a rapidly swinging frame. Of this galvanometer only the small swinging frame S, the indicator T, the appertaining scale, and the mirror are shown for want of space. A lengthy lamp U is disposed for emitting rays of light, which pass through a plate V of varying transparency, whereby they are graduated in their intensity step by step—or continuously, as desired. A lens W is disposed for collecting these rays of light and for sending them to the mirror above S, which, in turn, according to its position, may reflect them towards the selenium cell D in such a way that, according to the deflection of the galvanometer, a brighter or darker part of the graduated pencil of rays of light is thrown on the selenium cell. It will be seen that the second circuit described forms a secondary Wheatstone bridge, in the bridge of which the galvanometer frame S is inserted.

The voltage of the batteries E F in the primary Wheatstone bridge is so proportioned that for a certain degree of exposure of the selenium cell B—for instance, in its state of non-exposure—there is no drop of potential in the bridge between the two points. Then the little frame I will be without current, and its arm will occupy its middle position



Korn's Selenium Cell Photometer.

between the two stops L; while the mirror K will so reflect the rays of light from the lamp M that most of the rays will pass between the two selenium cells O P, while the remaining rays will act upon both cells in approximately the same degree. It will be seen that in this case the secondary Wheatstone bridge will be in equilibrium, and the small galvanometer frame S will be without current, so that its indicator T will point at zero on the scale, while the rays of light reflected from the mirror above will not fall on the selenium cell D. Thus the two selenium cells in the primary Wheatstone bridge will simultaneously remain intact.

For the purpose of photometry the system operates as follows: Any source of light to be measured is placed at A, and the lens C, which may be assumed to be covered with a suitable cap, is uncovered. Then the light will act upon the selenium cell B to reduce its resistance, so that the equilibrium of the primary Wheatstone bridge will disappear, and a current will pass through the bridge from juncture G to juncture H, and therefore will also pass through the small galvanometer frame I. In consequence of this, the frame will be turned, for instance, in such a manner that its arm L will bear against the stop. The latter is so adjusted that, for this position of the arm, the selenium cell O will be fully exposed. Then the equilibrium of the secondary Wheatstone bridge will disappear, and a current will instantaneously pass through the frame S, so that it will be turned, and the rays of light reflected from the mirror above will act upon the selenium cell D—the indicator pointing (say) at the maximum value on the scale. The exposure of the selenium cell D to the rays of light from the source U will result in a reduction of the resistance of the selenium cell D, whereby the equilibrium of the primary Wheatstone bridge will be approximately re-established. The current passing through the galvanometer frame I will decrease until the arm of the latter L leaves the stop. However, this arm does not quite return to its initial position, so that of the selenium cell O a greater part (corresponding to the exposure of the selenium cell B) will remain exposed, and in such a manner that the selenium cell D is, on the average, exposed to the rays of light reflected from the mirror above S in exactly the same degree as the selenium cell B. If the intensity of the light at A is moderate, a certain portion of the original current will continue to pass through the galvanometer frame I, the same as a corresponding portion of the original current will continue to pass through the galvanometer frame S, so that the indicator of the latter will point at some intermediary value on the scale. Thereby the intensity of the light at A is measured.

Manufacture of a Hydrogen and Methane Mixture.

SABATIER, P., of Toulouse, France.

No. 15,326; July 5, 1906. Date claimed under International Convention, July 7, 1905.

This invention relates to a process for the manufacture of a gaseous mixture containing hydrogen and methane, characterized by the simultaneous passage over nickel, iron, cobalt, or a mixture of these bodies—reduced from their oxides, raised to a temperature comprised between 400° and 500° Celsius of steam and of an artificial or industrial gas containing carbonic oxide, with or without hydrogen—such, for example, as water gas, Riché gas, mixed gas, Siemens gas, blast-furnace gas, and the like.

In earlier patents—Nos. 13,861 and 15,234 of 1906—the patentee indicated a process for the manufacture of a gaseous mixture containing hydrogen and methane, based, on the one hand, upon the decomposition of water gas in the presence of nickel, iron, cobalt, or a mixture of these metals reduced from their oxides, raised to a temperature of between 300° and 500° Celsius, and, on the other hand, upon the decomposition of steam in the presence of nickel, iron, cobalt, or a mixture of these metals, reduced from their oxides, carbonized (with regeneration of the metal) raised to a temperature of between 400° and 500° Celsius.

It is possible, he now says, to simplify the operation by operating simultaneously—that is to say, by supplying directly to nickel, iron

cobalt, or a mixture of these metals, reduced from their oxides and heated to a temperature comprised between 400° and 500° Celsius, a mixture of water gas and steam.

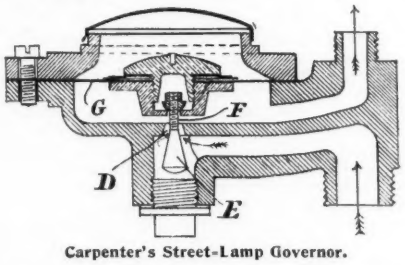
It will, of course, be understood, he remarks, that the reaction will still take place if the water gas should be replaced by some other artificial or industrial gas containing carbonic oxide with or without hydrogen (the mixture obtained containing, according to the gases treated, inutilizable gases—such as carbonic acid for example), "which inutilizable gases may be separated by any appropriate mechanical or chemical means."

Gas-Governors.

CARPENTER, C. C., of Old Kent Road, S.E.

No. 22,511; Oct. 11, 1906.

This invention—in "governors for street-lamps, fitted with flexible diaphragms"—relates to the means employed for attaching the valve spindle to the diaphragm.



Carpenter's Street-Lamp Governor.

The inlet and outlet passages for the gas are connected by an aperture D provided with a seating for the valve E. The valve E has a spindle F, which, in the ordinary way, would be attached to the flexible diaphragm G, stretched across the interior of the casing and open to the pressure of the gas entering at D in the manner well understood. According to these improvements, however, the valve spindle is screw-threaded and introduced through a hole in a central depression of a metal cup, where it is secured by a nut hemispherical on its under side. The metal cup is rigidly attached to the diaphragm by a plug screwed into it through the diaphragm from above. In this way not only has the valve the freedom derived from the flexibility of the diaphragm, but it has also an independent freedom derived from the joint; so that it adjusts itself to its seating with accuracy. Moreover, independent means for adjusting the valve to its seat without disconnecting the diaphragm attachment is provided by rotating the spindle F in the nut.

APPLICATIONS FOR LETTERS PATENT.

9701A-06.—COX, F. J., "Gas plants." April 20.
8662.—HICKMAN, J. B., "Gas connections." April 15.
8667.—SUTTON, C. J., "Packing mantles." April 15.
8685.—MURTA, P. S., "Gas heaters." April 15.
8744.—GRAETZ, M., "Inverted burners." April 15.
8822.—BRAUCHLIN, G., "Lighting gas from a distance." April 16.
8878.—WALMSLEY, J., "Taps and valves." April 17.
8897.—SCHOMANN, B., "Incandescent burners." April 17.
8918.—WALLER, E. B., "Recording the flow of fluids through pipes." April 17.
8919.—BUD, C., "Inverted lamps." April 17.
8936.—COWAN, T. W., "Converting upright incandescent lamps into inverted lamps." April 17.
8972.—BRAY, A., "Inverted burners." April 18.
9016.—ELTEN, A. P., "Gas-compressors." April 18.
9071.—HELPS, G., "Gas lamps and burners." April 19.
9072.—NETHERCLIFT, E. R., and GEORGE IRVING AND CO., LTD., "Gas-pendant and similar fittings." April 19.
9087.—WIGLEY, P., ARCULUS, G. N., and WARRY, J., "Inverted gas-burners." April 19.
9100.—ATKINSON, T. N., "Mantles." April 19.
9186.—THORP, T., "Equalizing the flow and pressure in the suction and delivery pipes of pumps, blowers, and the like." April 20.
9317 8-9-20.—ALTON, L. T., "Burners." April 22.
9385.—LAYCOCK, J., "Abstraction of ammonia or naphthalene from coal gas." April 23.
9427.—FOXLEE, J. E., "Acetylene-generators." April 23.
9446.—THE GAS METER COMPANY, LTD., and GOW, J., "Dry gas-meter indices." April 23.
9517.—MORRISON, J. D., "Gas-turbines." April 24.
9552.—SCOTT-SNELL, E., "Elastic fluid compressors for lighting and heating purposes." April 24.
9599.—LYNDE, F. C., "Globe galleries." April 25.
9609.—LA SOCIÉTÉ ANONYME WESTINGHOUSE and LEBLANC, M., "Jet condensers." April 25.
9639.—COLBRAN, J. B., "Gas-lamps." April 25.
9660.—EWART AND SON, LTD., and EWART, G. H., "Gas-geysers." April 25.
9663.—HARSANT, H., and CHALK, J., "Petrol lighting." April 25.
9760.—ELTON, A. W., "Tool for repairing retorts." April 26.
9859.—LOVE, G. R., "Gas-retorts." April 27.

New Joint-Stock Companies.—The Buckingham Gaslight and Coke Company, Limited, has been registered with a capital of £6200 (£1200 preference stock and 500 £10 ordinary shares), for the re-incorporation, under the Companies Acts 1862 and 1900, of the Buckingham Gaslight and Coke Company, originally constituted by deed dated June 30, 1834. All the shares were taken up prior to conversion. Thorium Limited is the title of a Company formed with a capital of £25,000, in £1 shares, presumably to deal in the material named in the title.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

"Coalite" and its Anticipation.

SIR,—I have been interested in all your comments on "Coalite" in the "JOURNAL;" and this morning I notice that you say (p. 288) that the material could be readily produced at gas-works if there was a demand for it. That is so, undoubtedly.

In connection with this fact, I may call your attention to the circumstance that, 22 years ago (in 1885), in my presidential address to the Gas Institute, I suggested that the smoke nuisance could be got rid of by the coal users carting all their coal down to the gas-works, and receiving in return thence the fuel in a smokeless form. It is, in fact, "Coalite" in embryo.

In my address I said that "my friend Rufus" had suggested this to me; but that was merely giving a kind of humorous turn to the idea, which was wholly my own.

Manchester, May 1, 1907. THOMAS NEWBIGGING.

Municipal Control of Gas Supplies.

SIR,—It was not surprising to find that the main point of my contention before the Eastern Counties Gas Managers' Association—that gas-works might be as well administered by a gas committee as by a board of directors—is admitted, without demur, both by yourself and by the writer of the article which appeared in last week's issue. The latter is scarcely correct in saying that I took as my test the results of municipal control in Lincoln. However it may appear to him, it was not the financial success—which he admits has been achieved—that induced me to write the paper, so much as the object-lesson it affords when viewed in the light of the criticisms I quoted, as typical examples of a sort common enough at the present time.

I wrote, in defence of a considerable section of the gas industry, to attempt the refutation of charges which should never have been levelled against it. As showing how little they are applicable, it is curious to note that, on the one hand, Lord Avebury complains that a trivial success is only attained by labelling as profit money taken from the pockets of the ratepayers; while, on the other hand, your contributor is chiefly concerned because of its abstraction by the ratepayers from the pockets of the gas consumers.

It was never my intention to claim perfection for municipal management; and it was rather the proof of capacity to realize profit, than the manner of its disposal, to which I directed attention. Certainly I do not wish to pose as an upholder of the system of subsidies to the rates. In this connection, history records that at the time the purchase of our own undertaking was under consideration, the inducement held out to the citizens was a promise of at least £2000 per annum out of profits (that is, from the gas consumers) for the relief of rates. Yet the writer of your article says that "gas consumers usually predominate as ratepayers," and would have vetoed the transfer at every poll of the town if they had anticipated the burden they have since had to bear. I believe that the gas consumer of Lincoln, if unduly penalized, is unaware of the fact, but is satisfied that the price he pays for the commodity supplied is reasonable and moderate—indeed, your own articles virtually admit that this is the case.

This vital consideration, too often ignored—that gas consumers do "predominate as ratepayers"—renders it certain that the members of a corporation elected by them could not for any considerable period pursue a course of action distinctly antagonistic to the interests of the majority of its constituents; and it also entirely eliminates the sting from such an expression as that used by your contributor, that the gas consumer is at the mercy of the ratepayer.

While admitting the advantageous position in which an undertaking is placed by the reduction of its capital debt, another point at issue between us appears to be that, by the provision of extensions out of revenue, we are at Lincoln arriving at this desirable end with indecent haste. This matter, also, I should be willing to submit to the residents of the city, who, according to the writer of the article, have reason to be proud of the happy financial position of the Corporation gas undertaking.

With reference to the larger question upon which you touch, I expressly exempted myself from discussing municipal trading generally, as being beyond the scope of my paper. The management of business departments by elected committees is not singular in being subject to the inevitable frailties and imperfections of human nature; and it would be surprising indeed if errors of judgment (to speak of nothing worse) did not occasionally arise. Financial muddles, I need hardly say, are not peculiar to corporation undertakings. The remedy would seem to be the sufficient education of public opinion, to ensure that municipal trading shall be governed by "such restrictive laws as are applied to commercial enterprise under private control," or, at any rate, shall be conducted with due regard to probity and common sense. Time will show whether this is a too sanguine hope. If it be so, the loss will fall on those who have deserved it, by electing as their representatives (both as directors and councillors) men unqualified for the position, unable to realize the responsibilities that the position entails, or incompetent to discharge conscientiously the task they undertake to perform.

I beg to thank both yourself and the writer of your communicated article for the kindly manner in which you have dealt with my paper, and trust you may find space for this concluding instalment.

Bracebridge Gas-Works, Lincoln, May 3, 1907. W. H. MAINWARING.

A Boy Dowser.—Occult powers are attributed to a Dutch boy, son of Heer Cornelius van der Westhuizen, of Roodepoort Farm, near Kroonstad, Orange River Colony, who has developed a remarkable gift of locating water. It is stated that whenever the boy stands over water in walking over the land, he stops involuntarily, and is seized with facial contortions and muscular movements of arms and legs.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills :—

Bills brought from the Commons, read the first time, and referred to the Examiners: Boston Spa Gas Bill, Grays and Tilbury Gas Bill, Worthing Gas Bill.

Bills reported: Basingstoke Gas Bill, Falmouth Gas Bill, Gas Companies (Removal of Sulphur Restrictions) Bill, Great Yarmouth Water-Works and Lowestoft Water and Gas Bill, Mitcham and Wimbledon District Gas Bill, Selsey Water Bill [new title], Southport, Birkdale, and West Lancashire Water Board Bill, Tees Valley Water (Consolidation) Bill.

Bills read the third time and passed: Basingstoke Gas Bill, Birmingham Corporation Water Bill, Gas Companies (Removal of Sulphur Restrictions) Bill, Southend Water Bill.

The Gas and Water Orders Confirmation Bill (No. 1) to confirm Provisional Orders made by the Board of Trade relating to Dorking Water, Freshwater Gas, New Tredegar Gas and Water, Skegness Gas, and Woking District Gas, and a similar Bill (No. 2) to confirm Provisional Orders relating to Herts and Essex Water and Mid-Kent and Twyford (Berks) Gas, have been presented, and read the first time.

HOUSE OF COMMONS.

The following further progress has been made with Bills :—

Bills brought from the Lords, read the first time, and referred to the Examiners: Birmingham Corporation Water Bill, Southend Water Bill.

Bill read a second time and committed: Devonport Corporation Bill [Lords].

Bills read the third time and passed: Boston Spa Gas Bill, Brighouse Corporation Bill, Grays and Tilbury Gas Bill, Shanklin Gas Bill, Worthing Gas Bill.

The first public sitting of the Joint Committee of Lords and Commons on the Metropolitan Water Board (Charges, &c.) Bill and Metropolitan Water Board (Various Powers) Bill will be held to-day. It consists of five members of each House—viz., Lords Cross, Winchester, Manvers, Aberdare, and Leith of Fyvie; Mr. C. Duncan, Sir John Randles, Mr. Rose, Mr. Whitbread, and Mr. Luke White.

At the sitting of the House last Tuesday, Mr. Hyde asked the President of the Board of Trade whether he was in a position to give any information with reference to the existence of compulsory reserve funds for limited liability companies in foreign countries. Mr. Lloyd-George said he had obtained information from France, Germany, Italy, and Belgium on the question of a compulsory reserve fund. In France, Germany, and Belgium, joint-stock companies were compelled to set aside 5 per cent. of their net profits for the formation of a reserve until the fund was equal to 10 per cent. of the capital. In Italy the law was that a similar proportion of the net profits should be placed to reserve until the fund was equal to 20 per cent. of the capital. In none of these countries were there any special rules governing the investment of moneys forming the reserve funds of joint-stock companies.

HOUSE OF COMMONS.

Monday, April 29.

WORTHING GAS BILL.

This Bill came up for consideration to-day, it having been reported from the Select Committee on the 26th of March. In accordance with notice,

Mr. RIDSDALE moved an amendment to omit the schedule, in which the lands proposed to be acquired by the promoters are described. He said the Parish and Rural Councils of Goring had formed the opinion that the erection of gas-works would be detrimental to the place; and they asked the House, through him, not to impose upon them a nuisance which really belonged to their neighbours. He pointed out that the Mayor and ten of the councillors of Worthing had petitioned against the Bill; and then went on to say that the village of Goring was about 400 yards from the place where the gasholders were to be erected; and the villagers were as strongly against the coming of the gas-works as the landlords themselves—110 voters out of 118 having signed the petition against the Bill. The reason would be obvious when he stated that Goring was a pretty village on the sea-side, to which in the summer many people resorted for a breath of fresh air. So far as he could gather, the arguments on the other side practically amounted to this—that there was no other obtainable site for the Gas Company to go to. But when he told the House that the Worthing Corporation included within their boundaries no less than seven square miles of territory, whereas the population was only some 23,000, it would be apparent that the question of sites must be an illusory one. In support of this view, the speaker proceeded to read the opinion given by Sir Alfred Bateman on a previous occasion, and concluded by again appealing to the House not to ride rough-shod over the wishes of the community concerned.

Viscount TURNOUR seconded the amendment, stating that the scheme was opposed by a good many influential residents in the town of Worthing itself. He said he believed it would be quite practicable to get a site for the gas-works in the town, or immediately to the east of it, if only the Company were prepared to pay a proper price.

Mr. WILES said he had no interest in the Gas Company, but he must say that the general feeling in Worthing was quite contrary to that just expressed. He believed from what he had heard in Worthing that a large majority of the people were strongly in favour of the Bill, because the gas-works were now too small to supply the large quantity of gas required, owing to the great increase in the population. With reference to the site, it had been said that other sites were available. He was informed (and he knew Worthing fairly well) that it was impossible to get any suitable site except at the eastern part of the town. The Committee to whom the Bill was referred, who went very carefully into all the details, were perfectly satisfied from the evidence they had that the site proposed was practically the only one available. It had been said that the Corporation of Worthing were against the Bill. He was advised by one who was a member of that body that only 10 out of the 32 members signed the petition. Therefore it was hardly fair to say that the public opinion of Worthing and the Corporation were against it. For the House to reject the Bill after it had been for four or five days before a Select Committee would be a very unusual course; and he hoped it would not be done.

Sir H. KIMBER advised the House to accept the decision of the Select Committee, who sat for five days and took evidence on oath. No suggestion had been made that the Committee had exceeded their duty in coming to the decision they had arrived at; and it was generally admitted that the Gas Company needed land. The greatest care had been taken to select the site in fulfilment of the Company's obligations to Parliament and the public; and it would be a travesty of anything which could be called justice to reject the Bill.

Mr. HUTTON, the Chairman of the Select Committee, said that Lord Turnour's case was a very strong one; but the Committee had carefully considered the arguments on both sides. This was the third time the Company had attempted to get relief; and it was admitted on all hands that something must be done, as there was no room to extend the plant sufficiently on the present site. He thought Sir Alfred Bateman had committed an error of judgment; and his opinion on other available sites was not worth anything, because he had not gone into the question at all, while the Committee had done so. The speaker proceeded to allude to various matters to be taken into consideration in getting land, and referred to the three sites suggested at the inquiry which were not considered suitable.

Lord TURNOUR asked if there were no other sites which the Company could obtain in the seven square miles anywhere on the east side of the town.

Mr. HUTTON said it was not for him to go all over maps. The Company ought not to be treated as a nuisance, seeing that they were supplying a public demand.

Mr. NIELD thought that the House ought to be very slow indeed to reverse the Committee's decision.

Mr. EMMOTT (the Chairman of Ways and Means) remarked that a good deal had been said about the nuisance that the works caused. The Committee had done whatever could be done to prevent this, by putting in a clause which would necessitate the planting of trees round the works when they were erected. Notice had been given to every house within 300 yards, and there were only four houses affected. After remarking upon the strength of the Committee and the consideration they had given to the question of an alternative site, which, he said, they need not have done, he asked the House to consider what would be the effect of upsetting the decision come to. It would stop the work going on, and prevent any increase in the supply of gas, which he understood was badly wanted in Worthing. He proceeded to impress upon the House the effect such a decision might have upon the Private Bill Committees. It would be a serious matter to interfere with the Committee work by upsetting a decision come to after such long and careful inquiry as had been made into this scheme. He made no complaint of the matter having been brought before the House, because the decision was an unusual one. There was no precedent for a Bill which had been passed by a Committee being rejected by the House; and he hoped the House would pause before they created one in this case.

Lord E. TALBOT thought the House would be taking a grave step if it sanctioned the precedent set up by the Select Committee, that a private Company had the right to dump down in a locality works from which the place derived no benefit, and to which it was opposed.

Sir F. BANBURY said he thoroughly agreed with the remarks made by the Chairman of Committees. If they attempted in the House to reverse the decision of a Select Committee, they might as well at once do away with such Committees, and settle matters in the House. He understood that the inhabitants of the neighbourhood concerned would have a legal remedy if the gas works, when constructed, became a nuisance.

Mr. RIDSDALE said, in view of the remarks of the Chairman of Committees and the speech of the Chairman of the Select Committee who considered the Bill, he would ask leave to withdraw the amendment, hoping that further evidence against the scheme might be adduced by the opposition in another place.

Water Supplies in Essex.

We learn that the Braintree Rural District Council have accepted the scheme, submitted by Messrs. Sands and Walker, of Nottingham, for supplying Coggleshall with water; and sanction for a loan of £4000 to cover the cost of the works is to be applied for. Boring operations and other preliminary work will be commenced at an early date. Sanction for a loan of £4000 has recently been granted to the Rochford Rural District Council for the purpose of making two reservoirs and carrying out other work in connection with the water supply. The construction, entirely of cement concrete, is half in the ground and half out. The walls are 12 feet in height by 6 feet thick at the base; and the floors are generally 18 inches thick. The roof consists of concrete arches between 12 in. by 6 in. steel girders, which are supported by 25 columns in each reservoir. Provision is made for ventilation, and access is obtained by means of locked manhole covers and iron ladders. The reservoirs will be supplied from the existing pumping mains; and a float and electric indicator will be provided and connected to the engine-room for the Benfleet reservoir, which is some distance from the raising machinery. The capacity of each reservoir is 150,600 gallons; and the pumps are driven by 7½ B.H.P. oil-engines in duplicate, capable of raising 6000 gallons an hour against a 95 feet head. The whole of the work is being carried out under the supervision of Mr. H. T. Sidwell, the Council's Engineer and Surveyor.

LLANDRINDOD WELLS GAS BILL.

This Bill, which is to incorporate the Llandrindod Wells Gas Company, and to confer on the Company power to construct works and manufacture and supply gas in Llandrindod Wells and other places in the county of Radnor, came before Lord ONSLOW, the Chairman of Committees of the House of Lords, last Tuesday, as an unopposed measure.

Mr. LEES (Parliamentary Agent), in presenting the Bill, said the question had been raised by Mr. Boyce, for the Local Government Board, as to whether, under clause 54, the Urban District Council of Llandrindod would have power to borrow in order to pay the purchase-money; so that he desired to consult with Mr. Boyce on this point.

Clause 54 of the Bill (added since its deposit) provides as follows:—

(1) If, within six months after the expiration of a period of 21 years after the passing of this Act, the Council serve notice to the Company requiring the Company to sell to them the undertaking in accordance with the provisions of this section, the Company shall sell the undertaking to the Council, and the Council shall purchase the undertaking from the Company accordingly.

(2) Any such sale and purchase shall be for such price or consideration, and on such terms and conditions, as may be agreed upon between the Company and the Council, or as, failing such agreement, shall be determined by arbitration in accordance with the provisions of the Lands Clauses Acts with reference to the purchase and taking of lands otherwise than by agreement; and in the construction of the said provisions the expression "the promoters of the undertaking" shall mean the Council, and the expression "lands" shall mean the undertaking: Provided that for the purpose of any such arbitration the sale and purchase shall be deemed to be a sale and purchase by compulsion and not by agreement. In addition to the sum to be paid by the Council to the Company under the foregoing provisions of this section, the Council shall pay to the Company the costs and expenses (not exceeding fifty pounds) incurred by them of and incident to the winding up of the Company, and compensation to any officers and servants in the regular employment of the Company for whom no regular office or employment on the same terms shall be found by the Council, in respect of any loss of office or diminution of salary or income; the amount of such costs and expenses and compensation in default of agreement to be determined by arbitration as aforesaid: Provided that no officer or servant who has been in the employment of the Company for twenty years or upwards shall lose his right to compensation as aforesaid by reason of his declining to enter the service of the Council.

(3) When the undertaking has been sold under this Act, and the purchase price or consideration paid or satisfied, the undertaking, and all lands, buildings, works, materials, and plant so purchased as aforesaid, shall vest in the Council freed from all debts, mortgages, or similar obligations of the Company or attaching to the undertaking, and the powers of the Company in relation to the manufacture and supply of gas within the limits or area of supply shall absolutely cease and determine, and shall vest in the Council; and the provisions of this Act, save such as refer to the capital and constitution of the Company, shall have effect as if the Council had been therein named instead of the Company.

(4) On such sale and purchase, the Council shall have the powers conferred upon an urban authority by the Public Health Act, 1875, where there is not any company or person (other than the urban authority) authorized by, or in pursuance of, any Act of Parliament, or of any Order confirmed by Parliament, to supply gas for public and private purposes, and as if the purchase of the undertaking were a purchase by an urban authority under section 162 of the Public Health Act, 1875.

A question was raised by the Chairman's Counsel as to whether, on the purchase, the provisions of the Act would be repealed or passed on to the District Council.

Mr. LEES expressed the opinion that the Act would be repealed, and that the Council would, upon the purchase, be vested with the powers of an Urban Sanitary Authority under the Public Health Act. But he said he would like to have an opportunity of further considering the question.

The CHAIRMAN ordered the Bill to await report.

SELSEY WATER AND GAS BILL.

House of Lords Committee—Monday, April 29.

(*Before the Earl of* LAUDERDALE, *Chairman, the Earl of* CATHCART, *the Earl of* CARNWATH, *the Earl of* VERULAM, *and Viscount* COLVILLE of CULROSS.)

This was a Bill to incorporate the Selsey Gas and Water Company to supply Selsey with gas and water.

Mr. WEDDERBURN, K.C., and Mr. KEEN appeared for the promoters; and the Hon. J. D. FITZGERALD, K.C., and Mr. SQUAREY represented Selsey Limited, the only petitioner against the Bill.

Mr. WEDDERBURN, in opening the case for the promoters, said that there was one objection to the measure from Selsey Limited; but he would object to their petition on the ground of *locus*. The proposed capital was £24,000; and there were the usual borrowing powers. The gas part of the Bill had been withdrawn, because it was found impossible to come to an arrangement with the Petersfield Gas Company. In the Bill as deposited, they had proposed to make certain works with the object of supplying water from North Munden; but an agreement had been arrived at with the Chichester Corporation, who would supply them with water in bulk at the boundary of the Company's area, so that no water-works would be required. The water-works portion of the Bill had, therefore, been abandoned. The question that remained was with regard to the necessity for incorporating the Company to supply to their area the water which they would obtain from Chichester. All that they were in need of was mains; and the result was that the Bill would be reduced. They would not have need for the capital of £32,000 as asked for, but only £20,000; the capital being reduced to £15,000 in shares and £5000 borrowing powers. The name of the Company would be altered to the "Selsey Water Company." Selsey was a small seaside resort to which a good many people went in the summer months—the resident population being only 1500, exclusive of the small places round about. It was, however, a place which was being developed, and a light railway was being introduced. The question which now arose was with reference to the water supply—Chichester never having supplied them. At the present day the supply was obtained from shallow wells, which was altogether unsatisfactory. The Local Government Board report said: "It appears from the information in the possession of the Board that the present water supply in the parish of Selsey is from shallow wells which are liable to pollution." Even as far back as 1901 the question of supply had been in the minds of the promoters. The arrangement that had been arrived at with the Chichester Corporation was felt to be a good one. The reservoir was higher than any land near it; so that they (the Company) would get a good pressure by gravitation. The Corporation were to supply the Company with all the water they required to meet their statutory obligations. The Corporation were not bound to supply in one day more than 50 per cent. of the average daily supply of the preceding year; and except in certain cases, such as a temporary breakdown, the Company were not to take water from any other source than the Corporation. The agreement held that the Corporation were to bring their 5-inch main to the city boundary, and to commence the supply as soon as the Company had laid their main up to this point. The time allowed to the Company in which to do the work was three years. The price the Company were to pay was 6d. per 1000 gallons up to 100,000 gallons a day; and after that, the price would be determined by arbitration. But it was not to exceed 6d. per 1000 gallons. The Corporation were not to exercise powers of supply in the Company's area during the continuation of the agreement, except at the request of the Company. This agreement had been added to the Committee Bill. The petitioners had absolutely no *locus* at all; the ground of their objection being that they wanted the powers of supply to be in their own hands. Urgent as the matter was, the petitioners had got absolutely no statutory powers at all; and they proposed no scheme. They were merely in the position of landowners. Selsey Limited was a registered Company. They agreed to pay the vendors £89,860, of which £60,000 was in shares and £29,860 in cash. They had no right to supply water at any time, and were in no different position to any single householder who owned a ¼-acre garden. Their area was 2580 acres—more than half of the whole parish.

Mr. *Allen* then gave evidence. He stated that he had purchased a small estate at Selsey, on which he proposed to build a residence, but had been unable to find pure water. He had to bring pressure to bear by complaining to the Local Government Board.

The CHAIRMAN here interposed, remarking that Counsel was raising minor questions. He asked Mr. Fitzgerald to state his objection.

Mr. FITZGERALD said that the Bill was promoted by persons who were incapable of carrying out any of the proposals named in it. On the other hand, the petitioners had a scheme of their own, and were willing to give an undertaking to proceed at once with it or some other scheme in the next session of Parliament for the purpose of giving a full supply to the whole parish of Selsey. It was essential that the Committee should know who the promoters were, and how the Bill was promoted. If the information given to him was correct, a Bill promoted in the way in which the one under consideration was promoted ought not to be passed through the Houses of Parliament.

Witness, in reply to Mr. Fitzgerald, who asked who the promoters were, said he had not the faintest idea.

Mr. FITZGERALD: If you were told that one of the persons named in the Bill was the caretaker of an office in the City; that the other two persons were clerks in an office in the City; and that the caretaker was caretaker at the office of a financial agent, would you have anything to do with it?

Witness: I cannot tell; I should make inquiries.

Mr. *P. Cogan*, Clerk to the West Hampnett District Council, said the whole area of supply was 10,524 acres, and it was desirable that the water asked for should be supplied.

Mr. *Cooper*, the Town Clerk of Chichester, said he was acquainted with Mr. Preston, the leading promoter of the Bill, who had been in touch with the Corporation ever since 1902. The scheme was undoubtedly promoted in the interests of the district of Selsey.

Mr. KEEN: Are you satisfied that Mr. Preston and any others associated with him will be able to carry out these powers?

Witness: The Corporation hope so.

Mr. *E. O. Preston* was then called. He said that on him would fall the chief burden of having the scheme brought into effect; and they were prepared to carry it through in six months. He was a financial agent, and had carried out several water schemes and promoted Acts of Parliament for the purpose. They had acquired rights to obtain land for putting down borings; and, as a consequence of the borings, they adopted a scheme for North Munden. They found, however, that it was opposed by the Chichester Corporation.

Replying to Mr. FITZGERALD, witness said he was the promoter of the Bill.

Witness went on to say, in reply to questions as to who the people named in the Bill were, that one was an accountant and another a housekeeper. He did not know who Mr. Ingram was, nor where his name came from. He always understood that the first three names were frequently nominal. He did not suppose any of these gentlemen had put any money into the concern. He did not know whether they were paid for allowing their names to appear. With reference to this particular Bill, he saw Mr. Newton Clayton several times in the summer; and the matter had been discussed for seven or eight years. The reason why Mr. Newton Clayton's name did not appear in the Bill was that there was some trouble between the parties, and Mr. Newton Clayton said he did not wish to be connected with them in any shape or form, and struck his name out of the Bill.

Mr. FITZGERALD went on to cross-examine witness with reference to a technical fraud in connection with the promotion of a Company some twelve years ago with which he was concerned; and witness stated that he bought back all the shares which the person bringing the action against him had purchased.

In answer to Mr. WEDDERBURN, witness said that the necessary £15,000 was actually in hand.

Mr. *Payne*, a civil engineer, agreed that £15,000 would cover the expenditure.

Mr. *Strachan*, of Chichester, stated that there was an urgent need for the supply of water at Selsey. There was no engineering difficulty in the scheme.

Mr. FITZGERALD, addressing the Committee on behalf of the petitioners, contended that the Bill ought not to be sanctioned. He did not intend to call any witnesses, though he had them in attendance, unless the Committee desired to hear them. It was common ground that a supply of water was required; and it was common ground that the persons principally interested were the petitioners, because they owned half the parish of Selsey. It was monstrous that a Bill of this kind should be promoted and a number of names of people used who had no knowledge of the case, while the real promoter hid himself behind them, and his name was not disclosed. It was even more extraordinary that the promoter should come forward and say he did not know how the names got into the Bill. Not one of the three persons named had put a single shilling into the promotion of the measure, and had no intention of doing so. The Bill was promoted for the purpose of selling it to Selsey Limited.

The Committee, without even clearing the room, ordered the Bill to proceed.

SOUTHPORT WATER BOARD BILL.

A Select Committee of the House of Lords, presided over by Lord Ribblesdale, commenced on Monday last week the consideration of the Bill promoted by the Southport, Birkdale, and West Lancashire Water Board to confirm an agreement entered into with the Skelmersdale Urban District Council for the purchase of the Scarth Hill pumping-station. The Bill was opposed by the Urban District Councils of Ormskirk and Lathom, on the ground that the pumping of water in increased quantities at Scarth Hill might diminish the supply from their wells, situated about 1½ miles distant; and they asked that the Board should be placed under an obligation to make good any diminution that might be caused in this way. The Committee, after hearing the evidence on both sides, intimated that they were not prepared to give a protective clause of the nature asked for; but they invited the parties to consider whether a provision might not be introduced into the Bill, limiting the quantity of water to be pumped from the Scarth Hill well. In compliance with the Committee's suggestion, rival clauses were later on brought up.

On behalf of the promoters, Mr. Balfour Browne, K.C. (with whom was Mr. Honoratus Lloyd, K.C., and Mr. Vesey Knox, K.C.) submitted a proviso enacting that the Board should not pump more than 250,000 gallons a day on an average, and that they should not take more than 300,000 gallons in any one day. This, he said, was not a protective clause. If the Board were to be obliged to give protection to Ormskirk and Lathom, they were equally entitled to claim protection as against them. If pumping at Scarth Hill could diminish the supply from the wells at Ormskirk and Lathom, pumping at these wells could equally diminish the supply at Scarth Hill. The quantity pumped could be ascertained from the record of the number of strokes made by the engine, and the promoters held that elaborate provisions for measuring the quantity were unnecessary.

The Hon. J. D. Fitzgerald, K.C., who (with Mr. Clease) represented the opponents, while accepting the limitation, argued that it was because they had contested the Bill that it was now proposed, and that therefore it must be for their protection. In order to make the proposal effective, machinery must be provided for measuring the quantity of water pumped. They therefore submitted a clause enacting that the Board should provide, adjust, and renew meters for measuring the water; that meter records should be kept; and that it should be open to the Urban District Councils of Ormskirk and Lathom at all reasonable times to inspect and test the meters.

The Chairman intimated that the Committee had considerable apprehension of protective clauses, which often led to misinterpretation and litigation. At the same time, they wished to be sure that the proviso proposed by the Board meant something and would be effective. Mr. Balfour Browne assured the Committee that the Board were quite willing, without giving the petitioners any protection, to provide that any person interested should have the right to inspect the record of the pumping-engine. At the request of the Committee, the Board's Engineer (Mr. Henry Rofe, M.Inst.C.E.) was called, and informed them that a daily record of the number of gallons pumped was automatically registered by the engine. It would cost at least £500 to £600 to fit up a meter.

The Committee having deliberated in private, the Chairman announced that they found the preamble of the Bill proved, subject to the proviso limiting the quantity of water to be pumped. They further decided that, without naming the District Councils, each and every interested party was to have access to the Board's records of water pumped. He added that while the Committee recognized that these records had to be kept for carrying on the ordinary business of the Board, it would make their intentions perfectly clear if it were stated that the proviso was based on these records. Mr. Balfour Browne undertook that this should be done; and the Bill was ordered to be reported.

Thermit Welding Process.—Judgment was given on Saturday, the 27th ult., in the case of *Thermit Limited v. Weldite Limited*. The action was due to the fact that the defendants were using an alumino-thermic welding process which plaintiffs claimed was covered by letters patent. It was admitted that the process was substantially the same as that used by Thermit Limited; the only difference being the addition of silicon to the compound. For the defence it was contended that there was nothing new or patentable in the process, and that the patent was bad for want of subject-matter. Mr. Justice Warrington, in giving judgment, found that the defence failed, and that the plaintiffs were entitled to an injunction with regard to certain specified patents.

GREAT YARMOUTH WATER-WORKS AND LOWESTOFT WATER AND GAS BILL.

House of Lords Committee.—Tuesday, April 23.

(*Before Lord* RIBBLESDALE, *Chairman, the Duke of* WELLINGTON, *Lord* ZETLAND, *Lord* BIDDULPH, *and Lord* RITCHIE.)

This was a Bill to authorize the promoters to construct further water-works and to take water from the River Bure, for the purpose of affording increased supplies of water to the Great Yarmouth Water-Works Company and the Lowestoft Water and Gas Company, and to confer further powers on the Companies with reference to their respective undertakings.

Mr. BALFOUR BROWNE, K.C., Mr. HONORATUS LLOYD, K.C., and Mr. GREGORY appeared for the promoters; Mr. MOON, K.C., and Mr. VESEY KNOX, K.C., represented the Great Yarmouth Corporation, who opposed the Bill.

Mr. BALFOUR BROWNE, in opening, said both the Companies were in urgent need of a further supply of water—Great Yarmouth more so than Lowestoft; and they had joined together in this scheme. The only petitioners against the Bill were the Yarmouth Corporation. A very similar measure to this was introduced last session; but the promoters were unfortunate in losing the Bill in the Second House. The works which they proposed to carry out—and which they were advised were practically the only ones which could be carried out for the supply of these districts—would take four or five years to construct. Therefore, as the want was urgent at the present time, the sooner they began the better. The Yarmouth Company were incorporated in 1853. The works for the present supply were at Ormesby Broad. The Lowestoft Company were incorporated in the same year. They obtained their water by means of pumping from the parish of Lound. The promoters had come to the conclusion that the only place they could go to for water was the River Bure. He was not at all sure what the attitude of the Yarmouth Corporation to-day was—whether they would dispute that more water was necessary.

Mr. VESEY KNOX said the Corporation admitted that some additional water was required for Yarmouth.

Mr. BALFOUR BROWNE: Therefore, the only question between us is whether the taking of water from the River Bure is the right place or not. Their object was to get the best water by the cheapest means they could. It would cost, with the additional works, £77,650. The two Companies would each pay half of this sum; and the Yarmouth Company were to filter all the water at Ormesby before they passed it on to the works of the Lowestoft Company. This filtration was a very important feature of the scheme. Last year they proposed to take the water from the River Bure at a point near Horning; and they did not provide any subsiding reservoir. One of the suggestions then made was that they should arrange for the sedimentation of the water; so this year they were providing a subsiding reservoir at Ormesby, which was capable of holding a seven days' supply on the average. They believed that sedimentation was unnecessary if the filtration was carried out to perfection; but they had added it as a sort of second line of defence. The objection raised was that it was river water, and that above the point of the intake there was a large gathering ground with a population of 24,000, that a few of them drained into the river, and that the drainage of the whole area came down to the point of intake. When the population was spread over this very large area, however, it did not seem to him to be a great lot. There were 6 million people in the London water area; and it had been determined that the Thames water was, by means of efficient filtration, made perfectly pure and efficient. The Bure water would be shown to be at least four times better than that of the Thames. The Corporation also said that the Broads were used in summer by a floating pleasure population, and that the water would be contaminated in this way. The Bure flowed into the River Yare; and the Corporation objected that salt water would be taken up the Bure by the tide. But it had been determined that the tide did not flow up as far as their intake, though there was a tidal influence. On certain occasions what was called a mixing action took place, and there was a considerable amount of salt in the water at the point of intake. In order to deal with this point, the promoters had introduced several additional conditions to those of last year. First they gave a subsiding reservoir at Ormesby, in addition to filtration; and if they took water at the point of intake when there were more than 20 grains of salt to the gallon, they were to be subject to a penalty of £10 a day. Then they were taking powers to enforce the Rivers Pollution Act, and they sought authority to make agreements with landowners to prevent pollution. They were only to take 4 million gallons of water a day from the Bure; but in the month of August (when the pleasure population was upon the stream), they had agreed that they should not pump at all. Therefore, the pollution from the yachts and wherries would not arise at all. The promoters had also agreed with the Port and Haven Commissioners of Great Yarmouth that they would only take 3 million gallons a day in the months of June, July, and September. The Corporation again said that the promoters should go to the chalk for their water. Strictly they were not entitled to go into that, because alternative schemes were not considered by Parliament unless full details of them were given. But so anxious was he to show they had considered alternative schemes—and considered them absolutely impossible and speculative to a degree—that he would not object to their going into the question.

In reply to the CHAIRMAN, Counsel said that the capital expenditure would be divided between the two Companies; but the Yarmouth Company were to bear the maintenance charges.

Mr. VESEY KNOX, having been asked by the CHAIRMAN if there was likely to be much discussion around the alternative scheme suggested by the petition, replied that there was. He admitted that the Corporation had made no scientific experiments in the matter. They had no power to do so, as they were not the water authority.

Mr. BALFOUR BROWNE said the Company had investigated the sources of supply from the chalk that had been suggested. He then dealt rather severely with a report made by the Local Government

Board, saying that the Board seemed to have adopted the clauses of the petition of the Corporation. The Board considered that the water should not be taken from the Bure if there was any other source reasonably available for supply. They further adopted the words of the petition by suggesting the chalk sources. He thought the Board had gone far beyond their bounds.

Mr. *Charles Hawksley* generally bore out the opening statement of Counsel. He said the time had arrived when Yarmouth must find an additional supply of water. It was a wise and economical step that the two Companies should, if possible, seek the same source of supply. The water was a fit and proper source for public supply, and the provision for filtering was most efficient. The water compared very favourably with Thames water. He was not aware of any water being available for the supply of this district except that proposed.

The DUKE OF WELLINGTON: Have you considered the possibility of pumping water from the chalk?

Witness: Yes; very fully. The chalk east of Norwich is uncertain in its yield, the quality of water obtained from it is very uncertain, and it is also liable to a certain amount of pollution. I should not feel justified in recommending the Directors of the Great Yarmouth Company to take the risk of expending their capital uselessly in search of water in that locality.

In reply to Mr. VESEY KNOX, witness said he would repeat his remarks of last year, that there was a prejudice against river supplies. He was in favour of them; and they would become more and more adopted.

Wednesday, April 24.

On the resumption of the proceedings this morning,

Mr. *C. S. Orde*, a Director of the promoting Companies, was called.

Mr. TYLDESLEY JONES (Counsel for the Yarmouth Port and Haven Commissioners) said the Commissioners as a body supported the Bill.

Mr. *Collins*, the Engineer to the Commissioners, gave evidence generally supporting the statements as to the small amount of pollution, and to the sufficiency of the precautions provided by the Bill for dealing with it.

The CHAIRMAN said the Home Office wished to know why the promoters did not think that section 2 of the Rivers Pollution Prevention Act of 1876 did not do all they wanted.

Mr. HONORATUS LLOYD replied that the powers might be in that Act, but the machinery was so clumsy that the promoters would like to have them in the form suggested in the Bill.

Witness (continuing) said the proposal was to submit the water to five days' sedimentation in a tank or reservoir; and, in his view, this was an adequate provision. The Bure catchment area consisted of 111,000 acres; and the population in 1901 was about 26,000, which worked out at more than 4 acres to one person.

In reply to Mr. MOON, witness said he did not know that the Rivers Pollution Prevention Act had not attained the objects for which it was passed.

Mr. MOON: Do you know, in regard to the River Thames, that the Metropolitan Water Board have obtained special powers from Parliament because the provisions of the Act were not sufficient?

Witness: That is so; but the conditions of the Thames are very special.

The CHAIRMAN suggested that the cross-examination of Counsel rather went to bear out the point of the promoters to put in the Bill the special powers they asked.

In answer to further questions, witness agreed that he had said in one of his letters that sufficient water could be obtained at certain places out of the chalk, if enough surface was bored; but he could not say how much surface, or how many wells would have to be sunk, nor what the expense would be.

Mr. HONORATUS LLOYD asked if the witness knew of any wells at or near Norwich which would be sufficient for a public water supply.

Witness replied that he did not. He said he knew that on the Dee at Chester the tide came up to the point of the intake at spring tide, and at such times pumping operations were suspended.

Mr. *E. M. Eaton* said it would be a very proper and economical arrangement to supply the water as proposed. The district was one in which there were very grave difficulties in getting water; and he was quite satisfied that the promoters could not procure a sufficient supply for the two towns, of the quality that was essential, from any district known to them in the neighbourhood suggested by the Corporation. There was plenty of water in the chalk; but experience in pumping showed that it was liable to be seriously contaminated. Moreover, the quantity to be obtained was purely speculative; and the time at the disposal of the Companies was not sufficient to allow of inquiries being made. There was really no practical difficulty in dealing with an occasional high tide, because it was always known when there was likely to be one. There was no water supply in the world where the undertakers had not to incur some risks; and he believed that in the present case they would be reduced to a minimum.

Thursday, April 25.

Dr. *J. C. Thresh*, in answer to Mr. GREGORY, said he had examined the River Bure and the water taken from it at various points. He had also examined the river from Coltishall down to a little below the intake; his object being to ascertain the amount of pollution which entered the stream, because all rivers must receive more or less polluting matter. He found generally a very wide valley in which there was but little direct access from the rainfall—that was to say, the ground round absorbed most of the rainfall like a sponge, and then it gradually got into the river. It was not a river which was liable to sudden and heavy floods, washing into it enormous quantities of polluting matter which might have been accumulated in the neighbourhood. This was a very great element of safety. With reference to the sources of pollution, these were, comparatively speaking, small. None of the villages—three or four of them—between Coltishall and Horning drained directly into the river. Most of them had cesspools; and the polluting matter was absorbed by the soil. If the cesspools overflowed, apparently they went into the marsh ditches. Such polluting matter in the marsh ditches—the only danger really was typhoid fever germs—became so changed that the germs rapidly died out; so that if afterwards they got into the river there was much less danger than if the sewage went directly into the stream. The amount of sewage actually going into the stream was very small. Nearly the whole of what did get in got in indirectly. Judging from the mere examination alone, he would say that the Bure water received far less pollution in proportion to its volume than did either the Thames or the Lea. In order to have a fair basis of comparison, he made an arrangement whereby for a time he had daily samples of Thames water taken above the intakes of the Metropolitan Water Board. These were examined together; and the result of the bacteriological examinations showed that the Bure water was never less than four times as pure as the Thames water, but that often it was twenty times as pure bacteriologically. As to the quality of the Bure water under usual conditions, undoubtedly it was an excellent source. He did find a small quantity of sewage bacteria, very much less than he found in the Thames; but this would undoubtedly be put right by filtration. At the point of intake, it was good water which could be safely used, if treated as set forth in the Bill, by the inhabitants of Yarmouth and Lowestoft.

In reply to the CHAIRMAN as to whether the capacity of the reservoir proposed in clause 6 was ample and sufficient, witness said if they had always seven days storage there it would be perfectly safe.

Mr. *Otto Hehner*, examined by Mr. GREGORY, said he had tested, by analysis and otherwise, the waters of the River Bure; and he agreed with the conclusions Dr. Thresh had arrived at, both with regard to the condition of the river and as to the quality of the water. With reference to the powers conferred in the Bill, in the Rivers Pollution Prevention Act, and the power to compensate and arrange with owners, he thought the provision was fully sufficient. The area from which the water was derived, 111,000 acres, was remarkably free from chances of serious contamination. He had examined all the so-called sources of pollution in the neighbourhood above and below the intake. There were very few such sources visible; and there were none which could not easily be dealt with in a couple of days.

Mr. GREGORY: In ordinary circumstances, in your view, it is impossible for any sewage of Yarmouth to get up to the point of intake?

Witness: Under ordinary circumstances, it does not come anywhere near. Under extraordinary circumstances, it is not likely; and I can barely conceive the very extraordinary circumstance that it should reach there.

Witness went on to say he considered that no water should be taken when the amount of chlorine came up to 20 grains. This would absolutely remove all risk. There was nothing easier than to carry this provision out.

Cross-examined by Mr. VESEY KNOX, witness said the river being a very slow-flowing one, deposited whatever solid substance came down with it. The water was clear at most times at the intake. The fact of a steamer going up and down the river would create no danger.

Mr. *W. L. Sutton*, the Public Analyst for the County of Suffolk and for the City of Norwich, gave it as his opinion that sedimentation for five days was amply sufficient for the River Bure. Wherry men and people living on the banks of the river drank the water; but he had never heard that injury resulted to them, or disease followed.

Mr. *G. R. Strachan*, examined by Mr. GREGORY, said he had, in conjunction with Mr. Hawksley, estimated that in 1925 Great Yarmouth would require 1,840,000 gallons of water per day, and Lowestoft 1,077,400 gallons. The Lowestoft works at present were capable of yielding permanently 625,000 gallons; and if an arrangement could be made with the Muckfleet Commissioners in relation to Ormesby Broad, it would be good for another million. So that if this arrangement came off, there would be in 1925 a deficiency, in round figures, of 1,300,000 gallons. He had considered what was the best source to obtain the water from; and he had come to the conclusion that the Bure was the only place where one could be sure of the quantity. With regard to the quality, the means proposed in the Bill would give an excellent water. The works suggested were sufficient to provide a pure supply. It was proposed to have a close month in August when no water was taken from the Bure. This was on account of the yachting. At other times the water was to be pumped through a sedimentation reservoir which would hold 6½ million gallons. There was no difficulty in enlarging this to 10 million gallons, either in level or in capacity. The site which was chosen was well adapted to form an enlargement if required. He agreed approximately that the cost of raising it from 6½ millions to 10 millions would be from £8000 to £10,000 more than they had in the Bill. There would be no engineering difficulty.

In answer to Mr. VESEY KNOX, witness said he had no doubt, with the help of the Public Health Act and the Rivers Pollution Prevention Act, they could keep the drainage area tolerably free from pollution.

Dr. *J. A. Gordon*, J.P., said in his 27 years' experience he had never known of a case of disease traceable to the River Bure water. He had only had two cases of typhoid in the last 26 years.

Dr. *James Ryley*, of Great Yarmouth, said with regard to the Bure water there was no evidence of pollution. If the water was treated as provided for in the Bill, in his opinion there would not be the slightest danger to the inhabitants of Yarmouth or Lowestoft.

Professor *Percy Fry Kendall*, Professor of Geology in the University of Leeds, also gave evidence on behalf of the promoters.

Witnesses were then called for the Yarmouth Corporation.

Mr. *Samuel Hassall*, Inspector of Nuisances for the Borough of Great Yarmouth, gave evidence as to the pollution of the river at different parts. Generally speaking, the greater part, if not the whole, of the sewage matter of the district was deposited in such a way that it might get into the river. He mentioned one farm where he thought it would be impossible to drain it other than to deliver it into the river, because it sloped at such a tremendous angle—the buildings sloped from the river edge. There were pigstyes, cowsheds, stables, and stockyard all running into a dyke within 150 yards of the river; and it was in a very foul condition. This was 5 miles from the intake. He was sure, from information received last year and this, that the Company had no intention of spending any money with regard to the alteration of the drainage in their respective localities. Nothing which had been suggested would deal with the pollution from the wherries, which would go on just as at present. Giving the Company credit for every desire to do the best they could, they would have an altogether different set of

circumstances to face from those on Ormesby Broad; and without large expense, the pollution nuisances could not be got rid of.

Dr. *H. W. Beach*, the Medical Officer of Health of Great Yarmouth, said, with regard to the powers which the promoters sought under the Bill, they might get rid of a certain number of the nuisances along the river, but there were some he thought would remain. There would still be a danger to public health.

Mr. VESEY KNOX: In addition to polluting matter from the banks of the river, from branches, and tributaries of the river and dykes, do you fear the effect of the polluting matter from the wherries?

Witness: Yes, I do.

Is that a growing source of danger?—The figures given me by the Port and Haven Official who registers the boats on the River Bure, show that there was an increase of over 100 per cent. last year in the number of pleasure craft registered on the Bure—from 251 to 521, which is an enormous increase.

Sir *Thomas Stevenson* said he had been acquainted with the water supply of Great Yarmouth for about nine years. He had inspected the River Bure, and had seen various people, not only at Horning, but at other places; but he did not find one person who acknowledged that he had ever drank it, or that anyone did. They all denied it. Having regard to the nature of the district, he thought it would be extremely difficult to stop the pollution. It would be necessary to alter the minds of the village people; and from his experience, he did not think they would alter much.

The CHAIRMAN: I suppose you would admit that the sources and condition of pollution can be very much improved by human resources and human science at present?

Witness: Yes; the cutting off of the source of nuisance is one, sedimentation is another.

Friday, April 26.

Sir *Thomas Stevenson*, further examined this morning, said he thought the proposed sedimentation would be ineffective.

In answer to Mr. BALFOUR BROWNE, witness said that, chemically, he found nothing noxious in the Bure water. At the time he examined it, it was similar to Thames water.

Mr. VESEY KNOX: We say the Bure water is absolutely unfit.

The CHAIRMAN said they would have to prove that. Whatever they might say about the chalk water would make very little impression on the minds of the Committee. They all knew there was water in the chalk; they all knew that it could be got; but no sort of experiments had been made. There was no proposal before the Committee, supported by trials of any sort, that sufficient water for the needs of Yarmouth and Lowestoft could be got from the chalk at a cost which the Committee would feel justified in thinking a fair one, having regard to the interests of the water drinkers and ratepayers of Yarmouth and Lowestoft.

Mr. VESEY KNOX said they had evidence to show it could be got.

Dr. *Klein* said he fully believed what had been stated by the Medical Officer of Health for the district—that a considerable amount of pollution went into the River Bure. If there was a patient recovering from typhoid in any one of the house boats which had been mentioned, it would undoubtedly be a source of danger to the water supply. With regard to the life of typhoid bacillus, it depended upon the nature of the water. Good sand filtration was a considerable safeguard against typhoid bacillus. The samples of the water from the Bure which he examined in July of last year were greatly inferior to the raw water of the Thames or the Lea. He had sampled the waters of the Bure only twice. From his observation of the river, he thought the results would be worse in the summer time than in winter. In order to confirm his view, he obtained another sample in March last, at a time when the river was at its best, and the results were very much more favourable. In the spring, summer, and autumn, he considered there was really a practical danger in using the River Bure water. He did not think, therefore, it was a water which ought to be taken, even with all precautions, for supplying a large town.

Mr. BALFOUR BROWNE: You have said that the Metropolitan Water Board, and the Companies before them, were carrying out their filtration in such a way as to distribute a good water. Now, there is no reason why our Company should not carry it out with equal efficiency to the London Companies?

Witness: From what I see from the Bill, I do not think it possible.

Mr. *G. F. Deacon* said the method of sedimentation proposed was worth something, but very little. The flow of the River Thames was just double the velocity of the River Bure. The purification of the Thames Valley had been a very costly process. If anything like the same measures were taken on the Bure, it would mean great expense.

Mr. VESEY KNOX having asked if there was any material difference between the cost of a chalk supply and the cost of the river supply which ought to weigh as against the question of public health, witness said he thought that, in the long run, it would be cheaper. He believed that chalk could be very cheaply tapped, and certainly very efficiently tapped. Continuing, he said that up to now Ormesby Broad had only been used for Yarmouth; in future there would be a supply given to Lowestoft as well. The Bure was to be used only when Ormesby Broad was not available, excepting at certain months—that was what he understood. But this would practically not be so, because it was obvious that Ormesby Broad could not supply both places, or anything like.

Mr. *G. H. Hill*, in answer to Mr. VESEY KNOX, said he did not consider the scheme was suitable for the supply of a large town. It was a polluted river; and he was not aware of any cases where water supplies for large towns had been laid out to take water from rivers already polluted. He knew there were certain safeguards in the Bill for protection—doing away with the pollutions and so on; but there was no authority in the district at the present time to deal with this. He scarcely thought the Water Company would be the authority to put over the district. It ought to be an independent authority.

Mr. BALFOUR BROWNE: Supposing the pollutions were all stopped, then would the Bure be a proper source of supply?

Witness: Yes; but I do not think you can stop them under the provisions of the Bill.

In conclusion, witness said the River Bure was not a source for any town to take a drinking-water supply from.

Mr. VESEY KNOX then addressed the Committee on behalf of the Yarmouth Corporation. The Corporation in this matter had no sort of direct money interest. It was a question in which they were spending their money—the money of the ratepayers—without hope of profit, without expecting to get anything in a money way out of their opposition, solely because they thought it their duty in the interests of the public health. Yarmouth was a health resort; and the Corporation felt that they owed to themselves and their visitors the duty of doing everything they could to prevent the imposition upon the town of what they believed would be a source of danger to the public health. This was their sole reason.

Mr. BALFOUR BROWNE, in reply, said the Company had consulted three of the most eminent engineers, three leading geologists, who had been consulted about the chalk water, and three chemists; and all these gentlemen had advised, first, that the Bure could be made a perfectly good source of supply, and, further, that it was practically the only source. He did not say that no water could be got from the chalk. Some might be obtained. There was water in the chalk; but how much could be got by sinking a well, no one could tell. Mr. Vesey Knox complained that the Company had made no experiments. The Company had asked the best advice they could get; and they all contended it was no use, and said they would get the same river water if they went down to the chalk. It would be in the Company's interest to see that the local authorities did their duty.

The CHAIRMAN: I assume there will be no objection to lengthening the period for which you do not take water from the Bure, beginning on the 15th of July to the 31st of August?

Mr. BALFOUR BROWNE: I heard your Lordship's suggestion to the witness; and I do not object to that.

After the Committee had consulted privately,

The CHAIRMAN said: The first thing I have to say before I give the Committee's decision is this, that, having listened to the evidence carefully, the Committee cannot accept, and do not desire to be saddled with, the adjective "polluted" in front of the River Bure. We do not consider that the River Bure, having regard especially to its being a holiday district, is more polluted, from anything we have heard in evidence to-day, than any other river from the Channel to the Tweed. The Committee are of opinion that the preamble is proved. The Committee desire that these particular points should be given effect to: That the period of non-withdrawal of water from the Bure should be extended from the 14th of July to the 31st of August; that the sedimentation clause be amended, the figures 5 to 7 being altered to 7 to 9; and that some words more or less meeting what I have indicated should be inserted in clause 18 as regards the Muckfleet Commissioners.

The preamble of the Bill was agreed to; and the Chairman was directed to report the Bill, as amended, to the House.

Municipal Coal Supplies.

This subject was down for consideration at the meetings of the Liverpool and Leeds City Councils last week. It was not reached at the former place; but it was at the latter, where Mr. Badlay moved the following resolution: "That, in order to balance the expenditure on the costly non-revenue producing departments of the city by an extension of the trading departments, thus increasing the purchasing power of the people by more effective production and distribution of commodities needed by all, it is hereby resolved that a Bill be immediately promoted in Parliament to empower the Corporation to purchase, own, and work a coal pit or pits, and sell or trade in coal, in such manner and quantities as the Council may from time to time decide." He said he calculated that in the coal supply for municipal services alone the Corporation would, by adopting the proposed resolution, save more than £100,000 per annum. Mr. Macrae, who seconded, said that 1s. increase in the price of coal meant to the Gas Committee an equivalent to a rate of nearly 2d. in the pound. At present the Corporation's trading concerns were at the mercy of the Coalowners' Association. Alderman E. Matheson spoke against the proposal. He held that a coal pit was too speculative a thing for a municipal investment, and that the different qualities of coal the Corporation needed for their various services would necessitate having a number of pits. Mr. J. Tetley said that, as a co-operative society's official, he was opposed to the proposal. He argued that it was too risky, and pointed out that even the miners were against their funds being invested in anything so speculative as coal pits. The Labour members continued to discuss the proposal at length; and the Council Chamber slowly emptied, until there were only about a dozen members left. It was pointed out that there was not a quorum of members present, and the question was counted out.

Decreased Gas Profits at Shipley.—Though the consumption of gas at Shipley in the twelve months ending the 31st of March last was 2,118,000 cubic feet more than in the preceding year, the working resulted is a debit balance of £931, owing, it is stated, to the increased cost of coal.

Gas Profits at Rotherham.—At a meeting last Wednesday of the Rotherham Borough Council, Alderman Gummer, moving the adoption of the report of the Gas Committee, made a statement as to the operations for the past year. He said 311 tons of coal less had been carbonized; but 7,800,000 cubic feet more gas had been made. Leakage of gas had been reduced to the extent of £700 in value. There had been an increased consumption of gas. The cost of production had been 7d. per 1000 cubic feet; whereas at Sheffield it was 5½d. If the policy he had previously advocated had been pursued in the past, a sum of £287,000 would have gone into the sinking fund to pay off the debt and improve the works, and the Corporation would have been able to supply gas at 1s. 3d. or 1s. per 1000 cubic feet, instead of 2s. 9d. as at present. The gross profit was £18,188, equal to 11¼ per cent. on the capital employed; and the net profit was £8471, against £6471 for the year 1905-6. He congratulated the Council on the results, and spoke very highly of the management of the concern by their Gas Engineer (Mr. J. S. Naylor).

LEGAL INTELLIGENCE.

COUNTY OF LONDON QUARTER SESSIONS.

Clerkenwell.—Monday, April 29.

(*Before Mr.* ROBERT WALLACE, K.C., *Chairman, and a Bench of Magistrates.*)

The South Metropolitan Gas Company's Assessment.

At the Sessions House, Clerkenwell, the hearing was this morning resumed of the appeal by the South Metropolitan Gas Company against the valuation of their undertaking by the Assessment Committees of the Woolwich Union, the Greenwich Union, the Borough of Lewisham and the Borough of Bermondsey. The previous proceedings in the case were reported in the "JOURNAL" for March 12 (pp. 690-693) and April 23 (pp. 244-247).

Mr. BALFOUR BROWNE, K.C., Mr. DANCKWERTS, K.C., and Mr. W. C. RYDE (instructed by Messrs. Budd, Johnson, and Jecks) again appeared for the Company. The Counsel for the respondents were; For the Woolwich Union, Mr. CRIPPS, K.C., Mr. HORACE AVORY, K.C., and Mr. E. W. COX-SINCLAIR (instructed by Mr. E. W. Sampson). For Greenwich Union, Sir RALPH LITTLER, K.C., Mr. MARSHALL, K.C., and Mr. R. C. GLEN (instructed by Messrs. Saw and Sons). For the Borough of Lewisham, Sir EDWARD BOYLE, K.C., and Mr. TYRRELL T. PAINE (instructed by Messrs. Newton, Lewin, and Levett). For the Borough of Bermondsey, Mr. HORACE AVORY, K.C., and Mr. R. W. HARPER (instructed by Mr. F. Ryall, the Town Clerk).

Mr. CRIPPS, on behalf of the Woolwich Union, proceeded to address the Court, and pointed out that the cases had been taken together to prevent repetition. The matters at issue, he remarked, were not many; and he should be inclined to say himself, as the case stood, taking the Company's own figures and the cross-examination upon them, it would be impossible for the Court to come to any other conclusion than that the appeal had failed. They would, however, bring their witnesses if the Court desired; and he would now indicate what their views would be. He would concentrate what he had to say under four heads. In the first place, what were they to take when dealing with the gross receipts? Were they to take blindly the quinquennial year, or exercise common sense to see whether in that year there were particular features which had to be set right to get a firm and business-like basis? Whether they set right the quinquennial year by eliminating what was obviously only incidental to that particular year, or whether they took an average of the preceding five years, they really came to the same result. This was the first point. The second point was the tenant's capital. Thirdly, there was the question of the 17½ per cent.; and lastly there was a point of considerable importance—though it might not be necessary, as they were so much within the figures—namely, the question of dealing with the meters, especially the automatic ones. It was clear upon the evidence that these were a necessary part of what he called the rateable hereditament to get the profits or income on which the whole case was based. It had been decided by the House of Lords that, when dealing with a rateable hereditament, one did not go into questions of fixtures, and what was attached to the soil; one took a different view, and saw what the landlord would have to let at as a whole in order to derive the income. This was the principle; and it excluded the vast mass of matters here as tenant's capital, and would exclude the extreme absurdity that the larger the revenue the less was the rateable value. As was pointed out in evidence, they had only to carry the automatic meter system to its logical conclusion to wipe out rateable value altogether. The figures in the present case were so ample—there was such a large margin—that it might not be necessary to raise the point; but he wanted to make it quite clear, on behalf of the Woolwich Union, that they thought the way these meters had been dealt with was quite wrong, and they ought to be regarded as part of the rateable hereditament. As to his first point—the question of the quinquennial year—he thought that really, underneath any superficial distinction, there was almost an agreement both as regarded figures and principle. They knew that in the quinquennial year from 1904 to 1905 the price of gas was reduced 1d. per 1000 cubic feet; and they also knew that, by curious coincidence, the same course of deduction had generally taken place when a quinquennial year was coming on. They also knew that the attempted explanation that this was a reduction merely made on the price of coal, was not in accordance with the tables which had been put in. He would ask the Court to bear in mind that if they set to work to put the quinquennial year fair, it would add rather more than £50,000 to the gross receipts—1d. per 1000 cubic feet was £52,000. If they took off from this the rateable allowance—7s. 11½d.—it reduced it to about £36,000. So that if the 1d. per 1000 cubic feet was restored, to get a fair basis of comparison, it added at once £36,000 to the rateable value. It was clear, taking the view most favourable to the Company, that they would at any rate have to restore this 1d. which was specially taken off in 1904 and 1905. One could not shut one's eyes to this—not blaming anybody for doing the best he could in these rating cases—if they had a concern where 1d. or 2d. was taken off in the quinquennial year, and then in the interval 3d. or 4d. was put on, it was impossible to limit the inquiry to the one year; they must take a wider view for the purpose of rating. After quoting at some length from Sir George Livesey's evidence, the learned Counsel said that the view that there was no sound foundation for the suggestion that the amount appealed against ought to be diminished was very strongly emphasized indeed when they came to the question of tenant's capital. He contended that, on Mr. Valon's own evidence, his tenant's capital, when properly analyzed, as it worked out, was quite inconsistent with the figures that had been suggested; and if they added to a proper analysis of what he would make the tenant's capital the £36,000, they were very much more than covered as regarded the rateable value against which the Company were appealing.

The CHAIRMAN: What is the difference between the figures the Company fixed it at and your figures?

Mr. RYDE: The figure against which they are appealing is £219,000 in Sir George Livesey's table.

The CHAIRMAN: I want the figure which corresponds to the £54,000 odd Mr. Ryde gave in his evidence.

Mr. CRIPPS: The respondents' total for what we are dealing with here is £124,787—that is, after taking off the agreed amount for indirectly productive works and mains apart from the parish. Now the figure they put forward is something a little over £50,000.

The CHAIRMAN: £58,000 in the case, and £54,000 in the evidence.

Mr. CRIPPS: And the figure we have to justify is £124,787. Anything beyond that, of course, is margin in hand. The difference is £66,000 roughly. Continuing, he said the £36,000 secured by restoring the 1d. in price would still leave £30,000 to bridge over according to his view; whereas he contended, on Mr. Valon's own admissions, that they had nearly £100,000 in hand. Comparing at some length Mr. Valon's evidence in the present case with that he gave in the 1897 appeal, the learned Counsel said that, putting his own figures and principles in 1897 to what they were dealing with now, instead of £252,000, his tenant's capital would come to £158,654. For himself, he would be inclined to call this the most audacious appeal that had ever been brought before a Court as regarded the rateable value of a gas-works. It was based on the proposition that, as the Company had been prospering, they were to put down the rateable value. This was an unchangeable proposition; and to back it up they had tried to induce Mr. Valon to upset everything he pledged himself to in 1897. As to the supposition that anyone investing in a statutory business such as this would expect to get a return of 17½ per cent., was it not ludicrous in these modern times? If the respondents had to go into their figures at all, Mr. Dinwiddy and other valuers would show a much more ample margin than he had done on Mr. Valon's figure; but was it necessary? He said that, as the matter stood, the appeal ought to be dismissed, because, taking fairly the evidence that had been given, it at any rate supported the respondents' figure as regarded rateable value. The Court would understand that what he was suggesting was substantially a nonsuit.

The CHAIRMAN said, as he understood it, the effect of this would be to prevent any decision on the controversial question which had arisen with regard to the prepayment meters. One was anxious to give an opportunity of getting it dealt with by the highest authorities of the country—the House of Lords, if necessary—as it was a question which had become of such great importance to the rating authorities and gas companies.

Mr. CRIPPS remarked that the Union he represented were not bound to make excursions into legal matters unless it was necessary; but if a decision on the meter question was necessary to bring about their rateable value, he would ask for it. Everything he had said, however, was on the other basis; and although they were very desirous to have a point of this kind settled, they could not have it decided as a mere theoretical point in this case. They would have to have it settled on some other occasion, when they had put the rateable value on a different level from that which they had done here. Mr. Horace Avory had pointed out that there was a case in which he was interested at Ipswich in which the point was being raised. Having regard to the great expense of continuing an inquiry of this kind, he asked the Court whether it was necessary to go any further and call his witnesses. It was clear, he submitted, on the Company's case, that the appeal ought to be dismissed.

Sir RALPH LITTLER, who followed for Greenwich, also urged that, on the Company's own showing, the appeal ought not to succeed. It was a little extraordinary that the Company had been growing in capital, in business, and in importance, and had been putting aside very large sums to reserve, insurance, and everything that could conceivably be imagined to be an advantage to a gas company; and yet at every succeeding quinquennial they came either to the Assessment Committees or to the Court to say how badly they were treated, and that there ought to be a decrease in the ratio of the rateable value. When the matter first came before the Court, the ratio was a little under 20 per cent.; then ten years ago the Court held that 15¾ per cent. (the amount appealed against) was not too much. The Committee, however, afterwards reduced it to 12 per cent., rather than incur the odium of having the price of gas raised. But this acted unfairly on a number of other large ratepayers, who had to bear the deficiency caused by this concession to the Gas Company. On the present occasion, the ratio of the rateable value had been reduced to 9½ per cent. If the prepayment meter business went on increasing, it would not be long before the rating became a *minus* quantity. And there was another thing to show what these meters were doing. The rent the Company obtained was £60,405; but the earnings of these meters were only £13,595, and the £46,400 which it took to maintain and repair them actually went in reduction of the rateable value. This was a startling proposition; and he put it so high that it was almost compelling the Court to an absurdity, if they granted the appeal. He then proceeded to quote cases to show that the 17½ per cent. was not an unvariable figure; and he contended that as the Company had an insurance fund they were not entitled in addition to include the 2½ per cent. put on for risks. He said that the Company had reserve and insurance funds and the undivided profits, which they might apply to equalizing dividends or whatever they thought fit. Under these circumstances, it would be absolutely unreasonable to say that this was one of the cases where the 17½ per cent. should be applied. Coming to the slot-meters themselves, he argued that the *Queen v. Lee* was not in the least degree applicable to the present matter. If it became necessary, and there was a case for the Court above, he would ask the Court to enable him to raise the question whether the *Queen v. Lee* was rightly decided. But this was not necessary, because the case was with regard to a different state of facts from those found here. The meters referred to in that case were said to be not indispensable; but Sir George Livesey and Mr. Bush said over and over again that they were indispensable in this case—which made a broad distinction. He himself failed to see, if they were as necessary as a main for the carrying on of the Company's business, why they could be dealt with other than as mains. The question of being on or off the premises had nothing to do with it. He quoted various judgments which he said bore on the point, and submitted that the slot-meters ought not to be taken into account as tenant's capital at all.

The CHAIRMAN: Do you apply the same argument to the stoves?

Sir RALPH LITTLER: With regard to the stoves, I do not want to go beyond what is absolutely necessary; but I select a point which seems so clear on the position of things that I do not need to go further. I should be quite prepared to ask your Lordship to state a case on the stoves also, if that time arrives; but it is not yet. Continuing, he said that, as to the stock of residuals, Sir George Livesey stated that the tenant would be bound to take them. Indeed, he would not, if he did not want them. The whole basis of the valuation made for these purposes was between a willing seller and a willing buyer. Therefore this item ought to be struck out, which made a difference of £65,374. If he was right in his contention as to the slot-meters and pipes and fittings, the effect would be to bring down the tenant's capital to something like £985,000, and to reduce the occupier's share to £187,000; and if this was worked out, it came to something like 11 per cent., instead of 4½ per cent. If the Company had not satisfactorily proved that they were unreasonably rated, he asked the Court to dismiss the appeal.

Mr. TYRRELL PAINE, on behalf of Lewisham, remarked that a table had been put in which showed that the deficiencies of the Company during the past twenty-two years had exceeded the surpluses by no less than £286,245; but during this time an insurance fund and a reserve fund were being built up out of the profits, which rendered the figure named a fallacious one.

Mr. HARPER (for Bermondsey) said he agreed with what had been said, and reminded the Court that this was a Statutory Company, protected against other gas undertakings coming in, and having competition from extraneous sources only—such as electricity. Therefore, the capital needed would be obtained at far less than the 17½ per cent. suggested.

Mr. BALFOUR BROWNE said his learned friends had attempted, by manipulating the appellants' figures—not by taking them—to argue that they had failed to make out a case. This was not the ground of a nonsuit. The first correction was that of putting on 1d. to the price. But this reduction increased the sale of gas. If they were to restore the 1d., they must get back to the position the Company would have been in with that price—not leave them with larger receipts and the same expenses. The respondents had refused Mr. Valon's valuation, and brought out a rateable value of £158,273, as against the £124,787 the respondents had to justify; and Mr. Cripps said that if this was the correct figure it was 12 per cent., and the respondents had proved their case. In 1897, however, Mr. Valon did not deal with the slot receipts; and as they had not allowed them in tenant's capital for slot installations, the sum of £54,244 brought back this time from the suspense account must be omitted from the receipts. They could not have it both ways. The effect of this would be to deduct from their revised figures of £158,273, not the whole £54,244, because that included rates, but £38,804; and this left a figure, not of £158,273, to compare with £124,787, but £119,469, which did not land the respondents. The 1d. was to be added to this, because it was only by this means that they arrived at the figure of 12 per cent. If they were to adjust at all, they must do so right through. They could not take into consideration the extra 1d. without taking into account also the price of coal; but the respondents had left the working expenses alone.

The Chairman and Magistrates then retired to consider the question of a nonsuit; and on their return into Court,

The CHAIRMAN announced that the case must proceed.

Mr. *Thomas Dinwiddy*, examined by Mr. MARSHALL, said the percentage of rating on gross receipts in the case of the South Metropolitan Gas Company had been coming down since 1880, when it was 18. At the last quinquennial, the Committees reduced it to 9½ per cent. He had prepared valuations based both on the year 1904, on the average of five years including that, and on the five years ending June, 1905. His impression was that, having regard to the special difficulties they had in dealing with the Company, it would save a great deal of injustice and a good deal of time if an average of five years was taken. His valuation for the year 1904 gave the gross receipts at £1,362,598; and the expenses (less residuals) at £576,751. This left the net receipts, *plus* rates and repairs, at £785,847. Deducting the tenant's share, £135,278, left a gross value, *plus* rates, of £650,569. Taking away the statutable deductions of £237,143, left the rateable value of the whole undertaking, *plus* rates, at £413,426. Deducting rates at 7s. 11½d. in the pound on the rateable value, made the rateable value of the whole undertaking £295,744. Taking from this the agreed rateable value of the works and dead mains, £108,678, there remained £187,066 for the reproductive mains. The uniform 9½ per cent. in the valuation lists appealed against equalled £124,787. His receipts were taken from the balance-sheet; and he had added the prepayment meter receipts, £52,434. The working expenses he had taken in the same way from the balance-sheet.

The CHAIRMAN pointed out that there was a difference of £80,000 in witness's expenses (£576,000) and those of Mr. Ryde (£656,000).

Mr. MARSHALL replied that there was £20,000 difference in the sum allocated to tenant's repairs. Then Mr. Ryde had included an item of £17,297 as 5 per cent. upon the total for repairing and renewing fittings, which Mr. Dinwiddy excluded. Then there was a difference of £26 000 in the residuals, due to variation in the year.

Examination continued: He allowed 4½ months' of his working expenses, as against the five months put down by Mr. Ryde, as necessary for the tenant to have in hand at the beginning of the year—being thus in accord with Mr. Valon and Mr. Stevenson. This was more than enough, but he had been in the habit of adopting it; and he did not like to vary from an old precedent. He took four months' receipts from residuals, the same as all the witnesses; and also four months' receipts from prepayment meters (as against Mr. Ryde's 3½ months). His deductions for residuals and automatic meter receipts came to £313,832; and his 4½ months of the yearly working expenses, to £402,248. This made the balance of money the tenant would require to have in hand £88,416, on which he allowed the full 17½ per cent. Then he put down one-third depreciation on ordinary meters and stoves, which he thought was a fair allowance; and he allowed 15 per cent. on the value of these, which was really omitting the 2½ per cent. for risks and casualties. On automatic meters, stoves, and fittings he also allowed one-third depreciation; but he regarded the piping for these as the landlord's—as practically a continuation of the mains. Upon his figure for the prepayment meters, stoves, and fittings, he took 12½ per cent. At the first view, this seemed inconsistent with the 15 per cent. on the ordinary meters; but he rather thought the excess was on the latter, and that he should have put 12½ per cent. on all. The stock of coal he took at six weeks, as all the witnesses had done; but with regard to unsold residuals, he allowed nothing, because the tenant would not want these. The Company claimed £65,374 under this head, 17½ per cent. on which would amount to nearly £12,000 a year to be deducted permanently from a landlord's rent, on the theory that incoming tenants took over this stale stuff from the last man—which Sir George Livesey told them they did not want. By accident, his tenant's share came to exactly 10 per cent. on the gross receipts. Coming to his valuation based on the average of five years, this arrived at the same result—which proved that 1904 was by chance a fair average year.

Cross-examined by Mr. BALFOUR BROWNE, witness said that, as to the receipts, the difference between him and Mr. Ryde was that they had taken different periods. With regard to the differences between them in the matter of working expenses, the £17,297 (5 per cent. upon the total for repairing and renewing fittings) he disallowed because he could not find it in the accounts. He regarded it as a fancy figure for rating purposes. The real difference between him and Mr. Ryde was, of course, in the tenant's capital. Witness's working expenses came to £1,109,716, as compared with Mr. Ryde's £1,227,525, or a difference of about £120,000. Mr. Ryde's figure, however, included rates, which would account for £60,000; and he had also £20,000 more in his tenant's chattels. As to deductions, witness took off half the Directors' and Auditors' fees; and he also deducted the £34,342 for profit-sharing, as it was not payable until the end of six months, when the receipts would have overtaken the working expenses. The profit-sharing bonus could not be regarded as wages; the men could not draw it every Saturday night. He did not agree that a tenant could not establish the same system. He could not say whether in 1897 he made a deduction for Directors' fees. As to the amount for fixing meter-shelves and stove-stands, which he had not allowed in tenant's capital, but Mr. Ryde had, witness argued that this was charged to revenue. He did not think that the tenant would require to have money for fixing as well as providing the meters and stoves. Then as to the piping in prepayment installations, he regarded this as being practically an extension of the mains, and did not look on it as tenant's fittings at all. In this, he was confirmed by the view Mr. Ryde took at Camberwell.

Mr. BALFOUR BROWNE: If the meter is to be the tenant's, surely the piping on the other side of it must be the tenant's too?

Witness: I rather agree with you. But I have given you the benefit of the meter with considerable doubt. I think it ought to be excluded; but I did not want to land all my Unions in litigation over it.

The CHAIRMAN: Are you going to assume the meter is the tenant's?

Witness: I granted it as the tenant's.

If you do that, will the other follow?—I think not.

Mr. BALFOUR BROWNE: I thought you said so.

Witness: No.

We will go over it again. Assume the meter is the tenant's, as you have in your valuation. Must not the pipe on the other side of the meter from the main be the tenant's too?—I do not think so.

Why not, when there is a meter belonging to the tenant between. How can it be an extension of the main? You cannot possibly have an extension of the main with a foreign property between?—I saw no greater difficulty than Mr. Ryde did.

The CHAIRMAN: We want to get the answer to that question. Assuming that the meter for this purpose is the tenant's, would the piping beyond be the tenant's too, if the meter is the tenant's?

Witness: I do not think so.

The CHAIRMAN: Can you separate them?

Mr. BALFOUR BROWNE: How can you separate? We know that some people may think the meter is not the tenant's; but if it is the tenant's, must not the piping beyond be the tenant's too?

Witness: I cannot see it myself.

Mr. BALFOUR BROWNE: I have no anxiety that you should, so long as the Court does.

Cross-examination continued: The amount that he had included for bankers' balance might be about £3000. He thought £25,000 would cover the rates and the bankers' balance. There was, however, an excess of £5000 on his tenant's capital of £960,000, beyond what the details showed; and this could be added to the bankers' balance. It was a fact that he allowed 17½ per cent. on the meters and stoves in use and in stock in 1897; but then they had not this extraordinary development of the prepayment business.

Mr. BALFOUR BROWNE: What has that to do with it? If 17½ per cent. was right then, why is it wrong now?

Witness: Mainly, it is the extraordinary revolution of figures caused by these prepayment meters.

That is nonsense, with great respect to you. If the principle was wrong with regard to one, it should be wrong with regard to the other?—Ten years ago, the Court held persistently for 17½ per cent. One felt that in this atmosphere it was sacrilege or heresy to talk of anything else than 17½ per cent. One felt bound to concede it.

Do you know, instead of doing that, you did allow on certain things less than 17½ per cent.? How can you say it was because the Court took 17½ per cent.?—Because in such things as stores and bankers' balance, there was some hope that one would begin to get a glimmer of reason in the Court. It is a most unreasonable thing, my Lord—I am sorry to speak with disrespect—but the whole system of 17½ per cent. all round was altogether wrong and out of date. We were bound to humour the Court by taking 17½ per cent. for some items.

You were asked about the 4½ months; and you said, "I did not like to vary from old principles." This Court has never yet varied from the 17½ per cent.?—I will not say that. We had no knowledge of what the proportion of the capital ten years ago was when we had this historical decision in this Court—we had no clue as to how they arrived at it. I do not think they gave 17½ per cent. on the whole of the tenant's capital. They must have graded it down, as the witnesses on my side said it ought to be. The decision of the Court makes it pretty clear that they could not have taken 17½ per cent. all round; but they must have been influenced by our getting in the thin end of the wedge.

Cross-examination resumed: He did not agree that when money was put into a business, it did not matter whether the capital went into one thing or into another.

Mr. MARSHALL (in re-examination): The piping in the houses between the meter and the fittings is frequently covered up in the walls, and so is a permanent fixture. Do you say that should be allocated to the landlord or the tenant?

Witness: I should say it should be allocated to the landlord, and would be rated with the house. I have treated it in that way.

Mr. DANCKWERTS: It is not inside the wall.

The CHAIRMAN: That is the assumption of the question. We have had a long discussion upon it already.

Witness: It would be covered with plaster.

Mr. *Conrad H. Dinwiddy*, examined by Mr. TYRRELL PAINE, said he had prepared a diagram showing the net receipts of the Company for the years since 1885. The net receipts per 1000 cubic feet of gas sold were (with the exception of the strike year) lowest during the whole of that period in the year 1905. Another diagram showed the balance of the undivided divisible profits from the year 1897 to the one now being dealt with. This showed that by the middle of the last quinquennial, divisible profits had been accumulated to £29,856. By the end of 1900, this had all gone. In 1904, £65,375 had accumulated; but just before the quinquennial this was reduced to £37,001, by the Company making less profit than they divided. Since then it had been further drawn upon for the same reason. As a summary in the last two quinquennials, in the 1900 quinquennial they deducted £28,498 from the reserve, and in the 1905 quinquennial they deducted £43,075 —making a total of £71,573; while in the other years from 1897 to the end of 1905, they added £93,673 to the reserve. The reserve remained untaxed altogether. Another table witness submitted was for the purpose of showing that there was a fallacy in Sir George Livesey's statement that "the deficiencies in 22 years exceeded the surpluses by £286,245," owing to the fact that the sums added to the reserve and insurance funds were not included. In fact, he said there had been a surplus in the 20 years to 1905 of £42,106, and not a deficiency of over £280,000.

Mr. DANCKWERTS: You do not seem to be aware that a good part of it is interest: so the whole of your calculation is a pure absurdity.

Witness: Yes; there was a small amount in interest. About £2000 a year, I think, it comes to.

In further examination, witness produced another table to show the rateable value per automatic consumer on Mr. Ryde's basis. The result was: Tenant's share, 12s. 6½d.; landlord's share (mains), 5¼d.

Cross-examined by Mr. DANCKWERTS, as to the object of this last table, witness said it showed a very large difference between the tenant's share and the landlord's rateable value.

Sessions House, Westminster.—Tuesday, April 30.

For the convenience of the parties, the hearing was resumed this morning at the Sessions House, Guildhall, Westminster.

Mr. *Dinwiddy, jun.*, produced another table to prove that, while Mr. Jones said 4½ per cent. on capital was a true test of rateable value, and Mr. Stevenson 5 per cent., the figures appealed against equalled less than 2½ per cent. on the landlord's capital value. His final table was a summary of the results of the working at 2s. per 1000 cubic feet for five half years—showing the deficit, and showing that the price must go up if these figures could not be disputed.

The cross-examination of the witness was postponed.

Mr. *H. Trustram Eve*, examined by Mr. HORACE AVORY, said he made a valuation for the year 1904, and also one for the five years ending the same date. His 1904 valuation was as follows: Gross receipts £1,386,700, less working expenses £580,310, leaves £806,390. Deducting occupier's share £118,750, leaves the gross estimated rental value (*plus* rates) £687,640. Deducting for statutables £232,037, there remains a net rateable value of the whole concern (*plus* rates) of £455,603. Deducting the highest possible amount of rates payable under present assessments £88,263, there is a net rateable value of the whole concern of £367,340—or £258,662 for the productive works. His gross receipts were £1,386,700, as compared with Mr. Ryde's £1,350,000. The most material difference in the two was witness's addition of 1d. "on account of gas being reduced below a fair average price in the second half of 1904." He was satisfied that 2s. 1d. might have been charged if the Company had chosen to charge it, leaving the working expenses as they were. This was rather important. It did not want correcting; it was a net addition. The increase would not have diminished the consumption. The more they looked into the figures, the more clearly they saw that no landlord would be foolish enough to let the undertaking on a basis of 2s. per 1000 cubic feet. The other reason why his receipts differed from those of Mr. Ryde was because of the different period taken. In the working expenses, he had allowed £50,000 for tenant's maintenance, against Mr. Ryde's £71,403; and he had not included the £17,297 for repair and renewal of fittings. As to tenant's capital, witness took 4½ months. There was always this difference in every gas case. He had never known respondents say anything less than 4½ months, and they absolutely believed in it. He had never heard Mr. Ryde say anything different from five months; and witness thought he absolutely believed in it. He himself thought 4½ months was too much, as a lot of the money was only required for a week or two or a month or two. Both Mr. Ryde and he gave credit for four months' residual receipts; and witness also took four months' automatic meter receipts, against Mr. Ryde's 3½ months. He had, against his wish, included in the tenant's capital the value of ordinary meters and stoves. He did this because he considered himself bound by the Phœnix Gas Company's case. But when he had done with ordinary meters, he was free to strike an opinion of his own; and he had always held most strongly that prepayment meters, stoves, gas-fires, and piping were not things to be allowed in tenant's capital. In the first valuation he made, he did not put in the stoves; and he had not put in the piping now. For the convenience of the Court it was assumed that it would be better to put them in, and say witness did not agree with them, or the figures would not be there. Slot-meters and gas-fires had been included; but not the fittings and piping, which in Mr. Ryde's valuation came out, he thought, at £172,000. He could not see that piping, gas-brackets, pendants, globes, or mantles were tenant's capital. He did not think anything was claimed for unsold residuals in the last appeal, which was a good reason for leaving them out this time. His tenant's capital cast up to £9·6,002; but in accordance with his usual practice, he said £950,000, which was really adding £44,000. As to the allowance of 12½ or 17½ per cent., there were times when both must be used. To his mind, the hypothetical tenant, in this particular case, was an absolute sleeping partner. He need not go through the place. He had paid for the same brains that managed the Company now. All he had to do was to sit still, and not worry, and pay his rent; and when he had done this, he would have (reckoning the figure as 12½ per cent.) £118,000 to live on, for finding £1,000,000, which witness thought from a business point of view was very good. Then the question was on what terms he could raise £1,000,000 as a first charge on the concern; and witness thought he would get it for much less than an annual payment of £118,000. If they were going to allow 17½ per cent. on a flourishing, prosperous Company like this, what figure would they put on a property that really had risks? If other properties were right at 17½ per cent. (and they never heard of more being given), then he thought 12½ per cent. was a fair amount in this case. The 2½ per cent. claimed for risks was absurd, as the Company already had an insurance fund. In the matter of deduction for statutables, there was not much difference between witness and Mr. Ryde; they both went on the same principle. The rateable value of the productive works at which he arrived—£258,662—worked out at 19 692 per cent. of the gross receipts. His valuation on the average of five years was calculated on the same basis as the previous one. In this case, the rateable value worked out at £240,724, and a percentage of 18·326 on the gross receipts. He had taken the receipts for the five years, at the price at which the gas was, in fact, sold. He thought it was necessary they should have a five years' average, because they had heard about the way the revenue account was "wobbled up and down," according to whether the Company had a good or bad year. He thought this was right from the Company's point of view; but to a rating man it entirely did away with any confidence he might have.

The cross-examination of this witness was also postponed, for the attendance of the Company's Counsel.

Mr. *William A. Mason*, another surveyor and valuer, examined by Mr. HORACE AVORY, produced valuations for the year to December, 1904, and on the average of five years to the same date. The former brought out a rateable value for the directly productive mains and pipes of £208,186, or 15·241 per cent. on his gross receipts of £1,365 982. He had not included anything for the extra 1d. which might have been charged for gas. The £17,297 claimed for maintenance and renewal of slot-fittings he disallowed. In the tenant's capital, he had included both ordinary and prepayment meters, and stoves; but he had not, like Mr. Eve, quite excluded the fittings and piping in the houses. Had he not heard Sir George Livesey's evidence, he should have left them out; but he had assumed the fittings left in the houses might have a value of 5s. per house.

Mr. HORACE AVORY: Then you have included in your tenant's capital a figure for these?

Witness: Yes; and I may say I had seen a copy of Mr. Ryde's tenant's capital in which he made a similar claim. I thought we should avoid dispute by adopting that figure.

The CHAIRMAN: Do you agree to it?

Witness: No.

Mr. HORACE AVORY: We want to know that. Ought it to be there, in your opinion?

Witness: It ought not to be there, in my opinion.

In your opinion, ought the stoves or these fittings to be there at all? —I would rather not say about the stoves. One can argue it; but I do not see a strong distinction to be drawn between the meters and the stoves. The stove is a little farther from the service-pipe than the meter.

The CHAIRMAN: You assume the meters have been decided by law?

Witness: Yes; till we upset the Phœnix case, we must follow it.

Mr. HORACE AVORY: I do not quite agree. When it is necessary, I shall say the Phœnix case never decided anything.

Examination resumed: Giving the Company the benefit of all this in his tenant's capital, he got a total of £933,497. When he came to the question of percentages on this capital, he took different figures for different articles. For the ordinary meter and stove stock, £320,169, he allowed 15 per cent. This earned £932,821—not quite three times the amount of its present value, as he estimated it. On slot meters £362,651, he allowed 12½ per cent. This only earned £43,019; and for this reason it was a leaner business, and a tenant could not expect the same return on it that he would receive from the more lucrative business of the ordinary meters. For other things, he allowed 10 per cent. He knew of no reason at all why 17½ per cent. should be allowed on such a capital as this; it was most extravagant. His result was £124,373 as the tenant's share of the receipts, as compared with Mr. Eve's £118,000. Witness deducted £58,000 as the tenant's share of the repairs. His five years' average valuation contained, he said, practically the same figures; and therefore he was not taken through it.

Mr. HORACE AVORY said this was the respondents' case.

Mr. George Helps, of Nuneaton, the Gas Engineer retained on behalf of the respondents, was therefore not called.

As Counsel for the Company were not present to cross-examine the witnesses who had been heard that day,

The CHAIRMAN announced that the Court would adjourn for twenty minutes, and then they would expect the case to go on and the cross-examination to be taken up. Otherwise the case would be concluded.

On the re-assembling of the Court,

Mr. BALFOUR BROWNE said the valuations of Mr. Eve and Mr. Mason were, as far as he had had an opportunity of judging, the same in principle as that submitted by Mr. Dinwiddy, with which he had

dealt at some length the previous day. He therefore thought it would be wasting time to cross-examine these witnesses. He then proceeded to address the Court; remarking that the case was, as it now stood, very much what he expected it would be when it was opened. The most important of the questions submitted to the Court was, How was the tenant's capital which it was necessary to arrive at to be made up. His learned friend Sir Ralph Littler, the previous day, blew a little hot and cold over the *Queen v. Lee;* but as far as he (the speaker) was concerned—and he supposed so far as the Court were concerned—unless they could distinguish that case from the present one, the Court would be bound to follow the decision.

The CHAIRMAN: You need not argue that point for the purposes of this case.

Mr. BALFOUR BROWNE (continuing) said therefore he would assume that the meters which worked with a penny in the slot were in the same relation to the tenant as those operated by a tap; and with regard to the stoves, he did not think any real distinction had been made. He wished, however, to point out one important feature in this respect. This new trade—or extension of trade—had been undertaken not with the view of making any profit on meters, but with a view to selling gas. There was a table put in the previous day by Mr. Dinwiddy which tried to show that the profit from the meter-rents, deducting repairs and renewals, would be £13,000. This, of course, was ridiculous, because it left out altogether the real consideration for which the Company supplied the meters—namely, the sale of gas. If anyone came to the Company, and said: "I will take your gas if you will supply me with burners," and they gave the burners, the burners, by being given away, would be a dead-loss to them; but if they got a consumption of gas, it would pay. It was on that ground the Company had gone into this particular trade—an absolutely essential trade, as had been stated by the appellants' witnesses, because they were in severe competition with other illuminants, and it was necessary to rely upon the poorer classes also as consumers; and they would not have taken the gas at all unless the prepayment meter had been supplied to them. One very ridiculous statement had been made by Mr. Dinwiddy on the previous day in a curiously vacillating way. He was asked to assume that the meters were a part of the tenant's capital, and to say whether in that case the pipe on the other side of the meter—that was, the house side—would be an extension of the main. At first the witness rather agreed with him (Mr. Balfour Browne) that the pipe would be tenant's capital; and later on he said he could not see that this was the case. This was the sort of evidence the Court were asked to act upon. He did not think it was satisfactory; and if, as he assumed, the gentlemen who had been called that day were merely intended to corroborate such evidence, he did not see the value of cross-examining, more especially as he had had a long turn with Mr. Dinwiddy. Of course, there were other points on which they differed. The Company had in their accounts taken it as a principle that a tenant outgoing would sell his residuals to a tenant incoming who was going to carry on the same trade that he had been carrying on. If this was not a right principle, it was possibly true that an incoming tenant would not require capital for the purpose of these residuals; but he would start without a business, and therefore for the first three months—or some period, he did not know how long—until he had residuals, he could not carry on the business. But the ordinary rule of all such things was that the outgoing tenant, instead of being requested to remove his coke and breeze, and things of that sort (which he would do at great loss, because he would have to hire a place to put them in), handed them over to the incoming tenant, who continued his business straightaway as from Jan. 1. He ventured to say this was a reasonable way of proceeding, and, therefore, that in the amount of tenant's capital this should be allowed for. If not, the forced sale of the residuals would have to be allowed for, because one could not get the same prices if they pushed them all on the market at once that would be realized if the sales took place in the ordinary way of business. There were various other items on which there was a difference of opinion. As to the gross receipts, the only point was that the respondents had chosen as the basis of their valuations the year 1904; while the Company had selected the year ending June 30, 1905. As to which of these was right, the whole process the Court was going through, as he understood it, was the mental process that the hypothetical tenant would go through if he were going to take over the concern. It was to find out what he, being a reasonable man, might reasonably be expected to give for the hereditament in the coming year. He ventured to say that averages in some cases were possibly unavoidable; while in others they were absolutely misleading. Take, for instance, the maintenance of a hereditament, if the hereditament remained the same an average might be a very fair way. On the other hand, even there the average would be entirely fallacious if the hereditament was increasing, because there was not the same entity to deal with. But when they came to consider gross receipts, he thought the first thing the tenant would want would be the very best evidence of what he would get next year. It was no use telling him what the past years were unless this was a guide to the coming year. Suppose the tenant was going into a small gas-works, and a large manufactory took one-third of the gas; and the tenant did not notice that on Jan. 1 they would cease to require this gas, and have their own electric light plant. What would be the good of telling the tenant that last year the firm paid £100 to the receipts? None whatever. On the other hand, with regard to ordinary consumers, it might be taken that if one went off another would come on. He put it most strongly to the Court that, in an undertaking which fluctuated, the best evidence one could possibly have was the evidence of the last year. It was known, of course, that conditions now were very different from what they used to be; gas was actively competed with. He would therefore ask the Court to say that a tenant coming in in 1905 would ask: "What is the last evidence? Is the concern going up or down? If it is going down, I cannot give the same rent; if it is going up, I can give more." Therefore the right year was clearly the one the Company had taken—down to June 30, 1905. Of course, the Court were not bound by it, because every Court must determine how they were to value; but this very point was raised in the appeal ten years ago of which so much had been heard, and it was decided that the evidence the Company put before the Court was the right basis. He did not say the Court were bound by this; but other things being equal, it was as well to adhere to it if right in principle. If he were the hypothetical tenant, he would not want averages. He would like, if he could, to have the figures for the next year; but the nearest to the next year was the last, and therefore he contended the Company were right in their view. Now as to the question of expenses. They had heard that the expenses were treated by Mr. Dinwiddy upon a similar basis to that adopted by Mr. Ryde, only, of course, there was the difference of year. The main variation in the two valuations of expenses was in two items. First, the £17,297 which was put down by Mr. Ryde for repairing and renewing fittings (5 per cent. on £345,938). For some inexplicable reason, Mr. Dinwiddy left this out altogether. The reason given—and why he (Mr. Balfour Browne) said it was "inexplicable"—was that it was not shown in the accounts. Neither was the suspense account; and yet Mr. Dinwiddy had dealt with this by bringing it into his valuation. A man could not play fast and loose. Part of the £17,297 was in the suspense account; and he admitted, and everybody knew, that these fittings did require repairing and renewing. The only other item was that of tenant's maintenance. For this Mr. Ryde put down £71,000, Mr. Dinwiddy £50,000, and Mr. Mason £58,000. Referring, again, to the ancient history of ten years ago, Mr. Dinwiddy put it at one-fourth of the total. This was the Company's figure to-day. He asked the Court to say that the Company's expenses and receipts stood unchallenged. He did not care what the other witnesses had said, Mr. Dinwiddy only criticized the Company's expenses in two particulars; and therefore their gross receipts and expenses were made out, he hoped, to the satisfaction of the Court. With regard to the other differences as to tenant's capital, the question of Directors' fees was too small a thing to really affect the matter, and the same with the Auditors. As to profit-sharing, however, he should like to say that, although the Company had formed a system of suspending wages, this would not be the case with an ordinary hypothetical tenant. No tenant would, he thought, establish a profit-sharing scheme. Mr. Dinwiddy admitted that it was in effect deferred wages; and therefore the £34,342 which he deducted from his tenant's capital would have to be restored and treated as tenant's capital, as had been done by the Company's witnesses. He deducted it in the wrong place, because he took it from the expenditure of the 4½ months. Then as to depreciation, Mr. Dinwiddy again had to refer to what was done in 1897, and said Mr. Valon then put 33⅓ per cent. Mr. Valon said it was the right figure then, but not now. As to coke, tar, breeze, and other products, Mr. Dinwiddy allowed them in 1897; and the Company asked to have them allowed now. The main point was what allowance was to be made to the tenant for the capital he had to provide. There were differences about this; but he thought that on the whole the Court would come to the conclusion that the respondents had written off far too much. Take, for instance, the question of bankers' balance. Mr. Dinwiddy allowed £3000; while it was proved that at one of their banks the Company had to keep £15,000, in compensation for their dealing with the enormous number of coppers taken from the slot-meters. A far more important matter, however, was the allowance the tenant should have for his capital. They had heard from Mr. Dinwiddy that his calculations in 1897 came out (when money was very much cheaper than now) at 16·4 per cent.; and in this case (when money was dearer) it worked out at less than 15 per cent. They would remember the evidence he put to Mr. Dinwiddy from an old case in 1892, where he (Mr. Dinwiddy) had really named the right principle. Whatever percentage was to be allowed it should be the same on all the capital. He (Mr. Balfour Browne) urged very strongly that there was no distinction between the capital at all. Now, what was the right percentage? In 1897, Mr. Dinwiddy had allowed 17½ per cent.; and he was sorry to say that his evidence in the present case was very vacillating as to why he had done so in that year. He ought as an expert to make up his mind as to what was right; and if he did not, he was an encumbrance, and of no use to the Court. This was why he did not cross-examine the other witnesses. What was the use of cross-examining witnesses who came and gave evidence like that? Mr. Dinwiddy was the "bell-wether;" he was the gentleman who led them. The others merely came to say "ditto" to him. He was educating the Court in the proper principles of rating. Mr. Dinwiddy said in 1892 the same amount on everything; and on that occasion when he (Mr. Balfour Browne) was cross-examining him, he said "You know very well that is the right principle." For once, Mr. Dinwiddy spoke sense. Now, let them see what the real amount ought to be, because he did not rely upon the evidence of this gentleman. It was to a large extent a business question. Some surveyors were in the habit of putting on 17½ per cent., and some, with no doubt justifiable views of their own, put a lower percentage. But in either case they had to consider that the capital, whatever it was, had to be found by the tenant, and must presumably be taken out of some other investment or else borrowed; and therefore his first consideration on entering into a speculative business like this would be that before he could count on any profit at all, he must have interest on his money. It would be no use going into it if he could not get interest; he could obtain that from a safe investment. He would calculate first what interest he was going to have, because he was going to lose it in some other investment. In Consols, which, of course, stood at the very top of sound investments, he might be getting 2½ per cent.; but it was a very different consideration with a tenant of such a business as this, who had not got the country at his back. He had nothing but the prospect of making in the next year what he thought from last year might be made; and he was asked to put a million of money or so into what? An undertaking which was liable to fluctuations and to competition; into tools which decayed and depreciated; and into meters which also depreciated. All this was the security for his interest. He would say: "I am not going to be content in a gas-works with interest on my money similar to that I had on my gilt-edged investment;" and he (Mr. Balfour Browne) ventured to say that 5 per cent. for interest was certainly very moderate. He did not think anyone who had capital would lend to the tenant at 5 per cent. Regarded as a temporary investment, he thought that, instead of 5 per cent., the money would not be raised at less than 6 or 7 per cent.; and if the tenant had to find it himself, and not to borrow it, he was entitled to the same return. It was a trade concern; and he ought to have a profit. Well, 10 per cent. was not a large profit on such an

undertaking. They had heard from Sir George Livesey that other people were able to turn over their capital three or four times a year, and that 20 or 30 per cent. profit was quite common. If one was not going to get a good profit, it was no use going into a speculative business. Then with regard to the 2½ per cent. It was a matter of security against risks—not only of strikes, which might (and did) occur anywhere. There was always a risk of strikes; and the tenant was entitled to be secured against this. But there was something entirely different, which brought down the percentage of 17½ per cent. to something like 13 per cent., on the evidence given by Mr. Stevenson. The tenant had to go into the business at the beginning of the year. Suppose he was the first tenant, he would have to find capital for an entirely new set of everything—meters, stoves, and all. At the end of the year he went out; and he did not get the new price for the things, but a depreciated price. What was the good of trying to tempt a tenant to go into a concern if he was going to lose the whole difference between new and second-hand (worn out, to some extent) goods at the end of the year? The tenant would say he must, before he gave anything to the landlord, have a percentage out of the receipts that would recoup him for the depreciation in his capital. This must come out of the 17½ per cent. somewhere; and according to Mr. Stevenson, he thought, it reduced it to about 13 or 14 per cent. Was this an excessive amount? He asked the Court to say it was not. Had anyone allowed one farthing of depreciation on tenant's capital? No. And yet they knew that every year new meters had to be provided; and at the end of the year they were second-hand, and one would not get half the money back. This a tenant must provide for; and the only provision made was in the 17½ per cent. Therefore he said that, on all sound principles, what they must look at was this: The tenant was going over in his mind what he would have to provide, and what he would get out of it. It was an entire fallacy that the landlord had to be considered equally with the tenant. It was the hypothetical tenant who had to be considered first. The question was what rent he could afford to give. This must always be the case, unless a man took a place for pleasure or merely for residence. In this particular instance, they must remember that the rent, once fixed, became a first charge; the rent was secured, the 17½ per cent. was not. The tenant only said: "If I can see my way to get 17½ per cent., I can afford to pay so much;" and when he had once entered into the bargain, the rent was a first charge, and he must whistle, if necessary, for his 17½ per cent. This was one reason why the 2½ per cent. was put in. They knew that, however carefully valuations were made as to what the probable return next year would be, there was no certainty. This was a risk which every sensible man would consider. Under these circumstances, and apart altogether from precedent or the practice of this Court or any Court, he ventured to say that, on good, sound commercial ground, 17½ per cent. for such an undertaking as this was not an unreasonable amount for the tenant to ask before he guaranteed the landlord his rent. It would be remembered that Mr. Dinwiddy, curiously enough, did allow 17½ per cent. on certain things. Why? Where was the principle? Principle—he had none! What did he do with regard to the meters? Ordinary meters, 15 per cent.; slot-meters, 12½ per cent. On what ground? None. Was there any principle in it? He had already tried to show out of Mr. Dinwiddy's own mouth that there was no distinction between any particular part of the capital and another. Therefore, when he conceded 17½ per cent. on some things, he must concede it on all. There was another suggestion made which he was bound perhaps to refer to, although it seemed to him rather far-fetched. Some of his learned friends suggested that a company or syndicate would be formed to take over the works; and, as he understood, Mr. Cripps contended that they would take 10 per cent. on some capital and 5 per cent. on other. He (Mr. Balfour Browne) had heard of many things. They knew the hypothetical tenant, but not the hypothetical syndicate. The simile did not help them. The syndicate had a mind like the hypothetical tenant, which must be made up on business considerations; and these considerations ought to be just the same as those of the hypothetical tenant. Another thing. The other side had been trying to manipulate the price of gas. The addition of the extra 1d. to the price of gas, representing £36,000, was wrong, unless the expense was adjusted as well. He would ask the Court to say on the two main matters the Company came to fight—first, that on the question of law they were right, that the prepayment meters and stoves, and pipes, were part of the tenant's capital (he did not think there was any question about this after the cross-examination of Mr. Dinwiddy); and, secondly, that having regard to all the business considerations he had been trying to put before them, the tenant would expect the 17½ per cent. which had up to the present time been allowed by the Court. He confessed it was not to be regarded as a law of the Medes and Persians; they must in every case consider what the particular security was. He did not think the case of the *Queen v. Lee* was touched by the Hunslet case, which went to the House of Lords.

Judgment.

Immediately Mr. Balfour Browne had completed his reply for the Company, judgment was delivered.

The CHAIRMAN said: In this case there is no reason at all why we should delay giving our decision. Probably it will be more convenient for everyone that we should do it at once. It is an appeal by the Gas Company against the assessment that has been fixed by the Woolwich Union—I take this, because one case will govern all. I regret in one respect the decision that we are giving will prevent the settlement of a question of great importance to all parties concerned, because the view we are taking of the figures given is such that we are assuming, for the purpose of this decision, that all these things—meters, automatic meters, stoves, and all the rest of it—were properly included in the tenant's capital. Whether this be correct or not, is a very different matter. I have a very strong view about it myself; but there is never any use in expressing views on matters which do not arise. In our opinion, it becomes unnecessary even to go into the figures with any closeness at all. We think that not merely must this appeal be dismissed, but that the figure fixed by the Assessment Committee is so, I was going to say, far below what in our view the evidence would warrant them in fixing it at, that it is most unnecessary to go into the figures at all. In coming to this decision, we have not taken any particular year. There is no principle to be laid down in regard to it. The question, after all, is simply that we are trying to find out what the hypothetical tenant would give. To find this out, we have considered the matter from the point of view of the average of five years, from the point of view of the year 1904, and from the point of view of the Company, who included the last half year, to June 30, 1905—both in regard to the gross receipts, and in regard to the expenses. We have taken them all for the purpose of forming in our own minds a fair estimate of what the tenant would give. We have endeavoured to eliminate some things that are accidents in regard to particular years. We have taken it all together; and we are not laying down any principle in regard to whether the assessment should be based on the last year or an average of years all weighed together. Having regard to these facts, and the evidence that has been offered, and the result of the cross-examination of witnesses called on behalf of the appellants, and having regard also to the evidence offered by the respondents, the figure is such that we have come to the conclusion that the productive mains—the only question open for discussion in this appeal—have been absolutely under-assessed; and we have come to this opinion assuming (a very large assumption) that the automatic meters, and the stoves, and the fittings, and all the accessories which are used, and are now said to be indispensable for the proper working and pushing of the trade, are to be included in tenant's capital—which is a proposition from which, as I said before, if we had to discuss it, in regard to a very great part of it, I should respectfully dissent, but for the moment I am assuming the other way. I want also to say, in regard to what is called the percentage that ought to be allowed upon tenant's capital, again I decline absolutely, and so do my colleagues, to recognize any percentage as fixed either by this Court or by any other. The percentage has to be taken into consideration in regard to every particular case, and having regard to all the varying elements which come into each particular case. A case of this kind—of a company established, progressive, largely receiving its receipts in cash, or at so short a period as to almost amount to cash, enjoying a monopoly of its own trade in its own district (I do not mean a monopoly against other competitors)—all these are elements to be taken into consideration; and we do not name 17½, 12½, or 15 per cent., or any other figure. But the figure we have fixed in our own minds in regard to the allowance is such that the amount fixed by the Assessment Committee is an under-estimate rather than otherwise. Under these circumstances, the appeal is dismissed with costs.

Mr. HORACE AVORY: That will apply to all the appeals.

The CHAIRMAN: Yes.

DUBLIN POLICE COURT.—Monday, April 29.

(*Before Mr.* SWIFTE, *Divisional Magistrate.*)

The Quality of Dublin Gas.

To-day his Worship had before him summonses issued by the Corporation of Dublin against the Alliance and Dublin Consumers' Gas Company, for supplying gas of which the illuminating power did not, the complainants alleged, when tested in the manner prescribed by the Company's Act of 1866, equal that prescribed therein and by amending Acts. There were three summonses relating to three separate dates—one set alleging a defective supply on the 28th of January last, and the other two sets on the 29th of the same month and the 4th of February respectively.

Mr. IGNATIUS O'BRIEN, K.C., and Mr. PHILIP WHITE (instructed by Mr. Ignatius J. Rice) appeared for the Corporation; Mr. RONAN, K.C., and Mr. JOHN GORDON, K.C., M.P. (instructed by Messrs. D. & T. Fitzgerald), represented the Company.

Mr. O'BRIEN, in stating the case, said the summonses were taken out under two Acts—a Public Act of 1866 and a Private Act of 1871. The Act of 1866 provided that within a certain area, under prescribed conditions, the gas should have an illuminating power of 16 candles. Other sections set forth that the Company should maintain proper means of testing the gas; and the Corporation or other authority might from time to time appoint an impartial person to make the test in the presence of the Manager or other officer of the Company. There were material differences between these provisions and those of the Act of 1871. Under the Act of 1866, the person appointed entered the premises of the Company, and, in the presence of the Manager or other officer, made the tests; under the Act of 1871, the Local Authority appointed a person to test the gas at testing-places, and the Company might be represented if they wished. It would be given in evidence that on the 28th of January the illuminating power was found to be 15·1 candles, on the 29th it was 13·6 candles, and on the 4th of February it was 14·8 candles. Subsequent Acts had raised the standard to 20 candles; but this having been found difficult to maintain, it was enacted that, in consideration of certain concessions made by the Company, the standard should be 16 candles, but that it should be maintained with certainty. For the purposes of this inquiry, the tests had been made on the apparatus provided by the Company, and in the manner provided by the Act.

Mr. *T. Cotton*, examined by Mr. WHITE, said that he was the Gas Examiner to the Corporation. On the 28th of January last he made a test of gas at the public testing-place of the Company, where there were two different photometers, both provided by them. He made three tests, each consisting of ten readings. The first was 15·03 candles, the second showed 15·1 candles, and the third 15·3 candles. These tests were made about 6 and 7 p.m., at which time the street-lamps were lighted. The average of the three tests was 15·1 candles. The next day he made three tests, again consisting of ten observations. The first, made at 6.36 p.m., showed 13 candles; the next, made at 6.59 p.m., 13·6 candles; and the third, made at 7.18 p.m., 14·3 candles—the mean being 13·7 candles. There were usually slight fluctuations between the readings, and large ones between the tests. He carried out a third set of tests on the 4th of February. The first test, made at

6.34 p.m., showed 14·9 candles; the second, made at 6.35 p.m., was struck out as unsatisfactory; and the third, made at 7.20 p.m., which was the mean of the two, showed 14·8 candles. He communicated the result to the Company.

In cross-examination by Mr. GORDON, witness said it was not true that during the past ten years nearly every test he made resulted in the reading being below 16 candles. He admitted that he might have found the gas below the standard on 200 occasions during the past ten years.

Mr. GORDON: Will you swear that you did not find gas under the standard on 300 occasions during that period?

Witness: I will not answer that.

In further cross-examination, witness said his readings were usually under those obtained by the late Professor Tichborne.

Mr. RONAN commented on the fact that no prosecution had been entered during the publication of Professor Tichborne's returns.

In further reply to Mr. GORDON, witness said that on Jan. 17, 1905, he made a test, which showed 15·4-candle power; and he had a record that Professor Tichborne made a test which showed 16·14 candles. The photometers on which they tested were of the same type. On Jan. 24, 1905, witness's test showed 15·9 candles, and Professor Tichborne's 16·29 candles. Witness referred to other dates on which Professor Tichborne's results were always higher than his. He turned to his book for the 5th, 6th, and 7th of March, 1905, and gave several instances on which the gas was above the standard. The average for the month was 15·9 candles; and he said he had no doubt Professor Tichborne's tests averaged over 16 candles.

Mr. GORDON: Is the instrument on which you made the tests one upon which you can rely?

Witness: The question is a very wide one; but the instrument may be relied upon to give results in ways favourable to the Company.

Do you approve of them?—They give unfair results. The Corporation do not consider them satisfactory. They have not, however, complained of them to the Company.

The witness was further questioned as to the accuracy of the testing instruments.

Mr. O'BRIEN objected to this line of cross-examination.

Mr. RONAN said the Company were being prosecuted for not keeping the gas up to the standard of 16-candle power, and he was entitled to try to disprove the witness's tests. The fact that it was the Company's own instruments which gave a wrong reading was irrelevant in the present case, even though the Company were afterwards prosecuted for keeping inaccurate instruments. They intended to bring evidence to the effect that the gas was up to the standard.

Mr. GORDON having read reports showing how far Professor Tichborne's tests differed from those of the witness, the further hearing of the case was adjourned.

Saturday, May 4.

On the resumption of the hearing of the case to-day,

Mr. *Cotton* was further cross-examined by Mr. GORDON. Witness said the testing-station was never approved of by the Corporation. It was not a necessary part of the process of testing gas to take the height of the barometer; and had he done so in this case the result would have been more against the Company. A cubic foot measure had to be used, as well as the readings of the thermometer and barometer to be taken, according to the terms of the award; but he did not use the measure, as it was wrong. He was not compelled to use it. Asked if he had ever tested the gas for quality as distinct from illuminating power, witness replied that quality and illuminating power were the same thing. He had not made a test for purity, because, he was glad to say, the impurities in the gas were so well taken out that he had no occasion to do so. He had never for five years seen a trace of sulphuretted hydrogen in the gas. This was the first prosecution he had had since he became Gas Inspector in 1888. He believed he made a test of the gas on the 2nd of this month.

Mr. SWIFTE: How can this be evidence?

Mr. GORDON: I want to show that Mr. Cotton cannot be relied upon as having made reliable tests. I showed at the last hearing that the late Professor Tichborne's tests did not agree with witness's; and I now want to show that the tests of Mr. Cameron, Professor Tichborne's successor as Board of Trade Gas Examiner, demonstrate that the gas supplied was over the standard on occasions Mr. Cotton's tests made it below.

Mr. O'BRIEN: We prosecute the Company for supplying gas below the standard on three separate dates; and I submit that we cannot go into what took place on other dates—certainly not on dates subsequent to the action. Mr. Cotton has been appointed Gas Examiner by a competent tribunal; and his tests must be accepted until he is removed from the position by another tribunal. The Gas Company are not entitled to take the reports of another gentleman and throw them down to us here, and say: "These differ from yours, and therefore yours must be inaccurate." I respectfully say that the reports for other reasons are not admissible here.

Mr. GORDON: I think I am entitled to show that the tests of Mr. Cameron and Mr. Cotton on the 2nd of this month differed in the same manner as those of the late Professor Tichborne and Mr. Cotton did.

Mr. SWIFTE: I do not think I can admit evidence about tests made on the 2nd of May.

Mr. GORDON: Very well, Sir, I will not pursue it.

On re-examination by Mr. WHITE, witness said there were three rooms for testing the gas in; each fitted with hot-water pipes. The late Professor Tichborne tested in room B, and witness in room A; and room B was defective. The Tobin ventilator was not placed in the room where it ought to be, and the photometer was not in the centre of the room (as the award stated it should be); and there was a fireplace in the caretaker's apartment underneath room B, which also increased the temperature of the room, and rendered it unsuitable for testing. He found a large difference between the two rooms; and it was always in favour of the Company.

In answer to Mr. GORDON, witness said no complaint about the room was made to the Gas Company by the Corporation, but he mentioned the defects to the Committee.

Mr. GORDON: Do you know anything at all about this subject?

Mr. O'BRIEN objected to such a question being put to the witness.

Mr. GORDON: It is a question of his qualifications.

Witness handed to his Worship a certificate he had received from the Chief Inspecting Examiner of the Metropolitan Board of Works, testifying to his competency and efficiency as Gas Examiner.

In reply to further questions by Mr. WHITE, witness said he was the Official Tester of the gas-meters in Dublin. He was appointed by the Board of Trade, and no complaint had ever been made of the tests.

This closed the case for the Corporation.

Mr. SWIFTE remarked that the Court was a most unsatisfactory tribunal for the trial of a case so highly technical as the one before him. He thought something had been said about agreeing to a certain course being taken.

Mr. O'BRIEN: Yes; if they adopt the system as it is in London, we would agree.

Mr. GORDON: We could not accede to that. A different class of burner is in use in London.

Mr. O'BRIEN suggested that it would be well for His Worship to visit the testing-station.

Mr. GORDON then opened the case for the Company. He said that in 1889 the Arbitrators who were appointed made their award, based on an agreement come to between the Corporation and the Company, and this testing-station was provided. From that time to this no prosecution had been entered upon. It lay upon the Corporation to establish their case—that was to say, they were to satisfy the Court that their contention was well founded. Under the award, it was specified what the testing apparatus was to be. They were not bound by Mr. Cotton's fancies, but by what was provided for by the statute. The conditions and apparatus prescribed by the award were adopted with the most scrupulous care by the tester on behalf of the Company, just as it had been by Professor Tichborne. Mr. Cotton had stated that on hundreds of occasions, according to his tests, the gas was below the standard; and, if so, why were the Gas Company not prosecuted for all or any of these deficiencies? But Professor Tichborne, who tested in the same building and with the same instruments, entirely differed from Mr. Cotton in his tests; and during his lifetime he could have gone into the box and proved that the quality of the gas was above the standard. The Committee of the Corporation visited the testing-station, and Professor Tichborne explained to them his method of testing, and the result was the Committee reported that "inside the same half hour, and working with the same apparatus, the illuminating power was 16·98 candles, whereas Mr. Cotton's test showed 15·67 candles;" and the Committee recommended that something should be done so as to put an end to the conflict of testimony. There was a case for a prosecution if there were any hope of sustaining it; but, of course, the Corporation could not face it. The Gas Company had always acted in a straightforward and proper manner, performing their duties faithfully and well, and had always been held to be right.

Mr. O'BRIEN said if the reports of Professor Tichborne were to be admitted, there would be no finality. That gentleman was dead; and they could have no proof as to the way the tests were made.

Mr. GORDON said he was at least entitled to refer to the matter. The Company were ready at all times to meet any attacks upon their honesty; and he asked his Worship, on the evidence adduced, to dismiss the summonses.

Mr. *William Brent*, the Tester for the Gas Company, was then examined. He said he had been for upwards of thirty years employed in testing gas. The instruments and apparatus were the same as those prescribed by the Arbitrators. He had never heard any complaints made as to the room, or that it had defects. He made tests every day—sometimes eight in a day; and he gave the results. All were above the standard of 16 candles. Witness compared some of his tests with those of Mr. Cotton—instancing those made on Jan. 28, when they were all over 16 candles. On Jan. 29, witness got 15·88 candles, and 15·72 candles in two tests on Feb. 4. All witness's tests were over the standard.

Mr. GORDON explained that the deficiency on Jan. 29 was owing to an accident in the retort-house plant, which was not discovered until the following morning. The deficiency was so small that the Company should not be penalized for it, under the circumstances.

In cross-examination by Mr. O'BRIEN, witness said his figures were to be absolutely relied upon, while those of Mr. Cotton were not. Mr. Cotton had neglected the first essential duty of a gas examiner in failing to test his apparatus.

At this point, the case was again adjourned until next Saturday.

RECOVERY OF WATER-RATES AND OTHER CHARGES.

At the Westminster County Court, on Monday last week, two interesting cases in which the Metropolitan Water Board were concerned were decided by his Honour Judge Woodfall.

In one case, Messrs. Keyser and Co. were sued for water-rate (which they admitted), but counter-claimed for the return of £11 15s. 9d. Mr. Copping, for the defendants, said about twenty years ago Messrs. Keyser had a gas-engine, in respect of which they were charged about £2 per annum. Some fifteen years ago, however, they sold the engine, but by mistake they had kept on paying the rate for it—first to the New River Company and afterwards to the Water Board. When the mistake was found out, the Board were notified; and he submitted that the defendants were entitled to recover money paid by mistake in fact, though not by mistake in law. They were suing only in respect of six years. The mistake had not been discovered, as the defendants, finding their yearly assessment the same as the year before, had gone on paying for fifteen years money in respect of an engine which they did not possess. Mr. Collins, for the Board, submitted that the defendants could not recover, as it was owing to their own negligence that the mistake was not discovered. He also said the defendants were nothing out of pocket, as they had not been assessed at their full legal amount. His Honour, in giving judgment for the defendants on the counter-claim, said the law was quite clear on the subject; and, as notice of the discovery of the mistake had been given at once, the defendants were

entitled to recover. The question as to whether they were paying their full legal rate did not enter into the matter, as the Board knew the full legal rate, and it was their affair if they did not charge it.

In the other case, Messrs. Wheeler, of New King's Road, Fulham, were sued in respect of the taking up and reinstating of the roadway in connection with a leakage in a water-pipe. The work was done, and an account for £3 sent in, which was paid by the defendants. Some time afterwards, a further account was sent in for £18 odd; and defendants were informed that the leakage had caused the water to percolate through the earth and the roadway to sink. The account was in respect of these repairs, which had been carried out by the Fulham Borough Council. Mr. Slade Butler contended that the defendants were not liable for the damage caused by percolation, even if it was proved, as their liability ended with the payment of the £3. But his Honour, without agreeing with Mr. Butler on the point, non-suited the Board, on the ground that they had not proved that the work had been done.

In the King's Bench Division of the High Court of Justice last Tuesday, Mr. Courthope Munroe moved *ex parte* (before the Lord Chief Justice and Justices Darling and Phillimore), on behalf of the Metropolitan Water Board, for a *mandamus* addressed to Mr. Hutton, a Metropolitan Police Magistrate, to hear and determine a complaint with regard to a rate. He said the point raised was whether it was necessary, under section 74 of the Water-Works Clauses Act, 1847, for the Board to cut off the water before applying for the recovery of the rate. The Magistrate took the view that it was; but the Board did not desire to cut off the water except as a last resort. The Magistrate was quite willing that the point should be determined, and he adjourned a number of cases until this was done. The rule was granted.

Claim in Regard to an Abandoned Reservoir.

In the Court of Appeal, last Tuesday, Lords Justices Fletcher Moulton and Buckley had before them the case of *Jones v. Maesteg Urban District Council*. It was an appeal by the defendants from a decision of Mr. Justice Sutton refusing to stay proceedings at law for the matter to go before an arbitrator. The plaintiffs in the action were Messrs. Gordon Jones and Co., trading as William Jones and Co., contractors, of Neath, and they had entered into a contract to construct for the defendants a reservoir to hold 30 million gallons. It appeared from statements made by Counsel that the original contract was for £28,000. The firm had done £21,000 worth of work when the contemplated reservoir proved impracticable. The Council decided to abandon it; and they gave the firm notice to omit the rest of the contract. The contractors thereupon entered a claim for £30,000 loss of profit on works not executed, and also for a sum of about £9000, the value of plant left on the site of the reservoir. Master Chitty refused to order the proceedings to be stayed for the case to go before an arbitrator, on the ground that points of law of importance were involved. On appeal to Mr. Justice Sutton, his Lordship refused to alter the Master's decision, and the defendants appealed. Mr. C. C. Hutchinson and Mr. Fletcher Moulton appeared for the defendants (now the appellants); Mr. Acland, K.C., and Mr. George Ricketts represented the respondents. Lord Justice Fletcher Moulton doubted whether any arbitrator would go into the matter without an advisory special case; and Lord Justice Buckley thought the case was one that should go to an Official Referee. Mr. Moulton said he agreed to the case going to a referee if the decision was to be final, and there was to be no appeal. Mr. Acland said he could not consent to this. Lord Justice Fletcher Moulton said an appeal was not likely to be successful. The matter must go to an Official Referee; the costs to be the costs in the cause. An order was made accordingly.

Floating the Combined Incandescent Mantles Syndicate.

In the Chancery Division of the High Court of Justice, a few days ago, Mr. Justice Warrington had before him a case which raised the question of the meaning of "offering share capital to the public for subscription," within section 4 of the Companies Act, 1900. By the writ in this action, dated April 8, 1907, the plaintiff claimed against the defendants, the Combined Incandescent Mantles Syndicate, Limited, the return of £705, being the amount paid by him to them on an application for 1410 ordinary shares of £1 each in the Company; the consideration for the same having failed, the Company not having within 40 days after the first issue of the prospectus (on Feb. 15, 1907) obtained the amount named therein as the minimum subscription, or in accordance with section 4 of the Companies Act, 1900, upon which the Directors might proceed to allotment. The Syndicate was incorporated on Jan. 22, 1907, with a capital of £33,000 in £1 shares. A prospectus was drawn up, dated Feb. 15, 1907, upon which five gentlemen, among whom the plaintiff and one Mr. Charles Vinkeles Houssart were included, were named as the Directors. It stated that the Syndicate had been formed for the general purposes mentioned in the Memorandum of Association, and, in particular, to take over an option for a contract, dated Jan. 24, 1907. The minimum subscription upon which the Directors would proceed to allotment was fixed at £5000; and this amount had not been subscribed. Applications were made for shares amounting to £3812; and the sum of £1906 was paid on application for such shares. The plaintiff had applied for 1410 shares, and had paid £705 in respect of them. He now moved for an injunction to restrain the Company from drawing upon, and the London and County Banking Company, Limited, from parting with, any moneys standing to the credit of the Syndicate at the bank, until the trial of the action or until further order. It was contended by Mr. Rowden, K.C., and Mr. Boome, for the plaintiff, that share capital had been offered to the public for subscription within the meaning of section 4 of the Act of 1900; and that, the conditions required by the section not having been complied with, and 40 days having passed since the issue of the prospectus, he was entitled to a return of the money paid on application. Mr. Norton, K.C., and Mr. Stamp, for the Company, were not called upon to argue. His Lordship came to the conclusion that the plaintiff had not made out that there had been any share capital offered to the public for subscription within the meaning of the Act; and therefore the application must be refused.

MISCELLANEOUS NEWS.

NOTTINGHAM GAS INQUIRY.

The Special Committee appointed to inquire into the working of the gas undertaking of the Nottingham Corporation having, as reported last week, completed their inquiry in public, have since been closely engaged in considering the terms of the report to be submitted for the consideration of the Town Council. Writing last Saturday, our local correspondent said: The matter is obviously one of much complexity. A great mass of evidence was taken in the course of the ten sittings over which the proceedings extended; and while some of it might well be regarded as savouring of redundancy, it for the greater part served the eminently practical purpose of placing the engineering details in a light which had been previously somewhat obscured by the unnecessary importation of personal animosity and not a little partisan spite. It is felt that had there been less of obstinacy manifested in the earlier stages of the controversy by one or two of the former members of the Gas Committee, much valuable public time might have been saved. The November elections indicated the determination of a large section of the ratepayers that, after the many ill-founded reports to which currency had been given, there should be no further trifling with matters; and inasmuch as this has led to an opportunity being afforded to Mr. J. H. Brown, the responsible Engineer, of making his position perfectly clear, the inquiry may be regarded as having served a useful purpose. It was evident from the first that one man who had nothing to fear from the fullest investigation was the responsible head of the works, who during his period of office has brought into a condition of efficiency many sections of an undertaking which had been fast drifting into a moribund condition. It had been hoped at one time that the Special Committee's report would be available for consideration at the ordinary monthly meeting of the Council on Monday; but this has been found to be impossible of accomplishment. The Committee have a great amount of material yet to assimilate before a decision can be arrived at; and it will probably not be until the June meeting that the whole subject will again come up for discussion in the Council Chamber. Meanwhile, indications are not wanting that the report may be largely in the nature of a compromise, which may possibly afford satisfaction to an official whose action has been largely misrepresented, while also letting down as lightly as possible the amateur *quidnuncs* who, in an excess of party spirit, have set themselves up as judges of engineering details as to the real nature of which their own statements have proved them to be profoundly ignorant.

MINERS' EIGHT-HOURS DAY COMMITTEE.

Evidence of Sir George Livesey.

The Departmental Committee appointed by the Board of Trade to inquire into the probable economic effect of an eight-hour day for miners, heard the evidence of Sir George Livesey at their sitting on Wednesday last. Mr. RUSSELL REA, M.P., occupied the chair.

Sir *George Livesey*, in giving evidence, said that the amount of coal consumed per annum by his Company was about 1,200,000 tons. In the whole of London, he should say the consumption was about 3½ million tons; and the gas industry, taken as a whole, would consume about 15 million tons. Dealing with the hours of labour in his Company's works, he said that work in gas-works was almost continuous. The South Metropolitan Company had changed their system from a long shift to a short shift. Gas making, being continuous, seemed to lend itself to being divided into three shifts. As long ago as in the fifties, Mr. William King, the then Engineer of the Liverpool Gaslight Company, introduced three shifts; but it was not followed by others. Later, Bristol and one or two other places adopted the system. He traced history down to the gas strike, the formation of the Gas-Workers' Union, and the adoption of the three-shift system by the men. The Union got better terms than had previously been offered to the men. They got it without any reduction in pay; and there was an estimated reduction of work of about 20 per cent. The Union made it perfectly clear that one of their chief objects was to absorb the unemployed. When the strike was declared at an end, the new men were left free to choose the three-shift or the two-shift system; and at some of the works they chose the one, and at others the other system. It was a matter of indifference to the Company which the men used, because they were paid 6s. for the eight-hour shift and one-fifth more for the longer shift.

The CHAIRMAN asked what was the effect on the unemployed.

Witness said that half-a-century ago it was the idea that gas stoking was eminently work for machinery; and it was tried in various places. From 1860 onward there was invention after invention; but none of them succeeded. The first machines made were never strong enough; and gas managers had not sufficient interest in them to make them succeed. Therefore, machinery did not come into practical use till the eight-hour system was adopted. When that came about, a friend of his said: "Now you will see machinery will come in." It did. From that time everybody went in for machinery with a determination to make it succeed; and it had succeeded. A great deal of work was now done by machinery; and the result was that less men were employed. The eight-hour system had, for that reason, had quite the opposite effect to what had been expected. The work was also done under greater stress, and required stronger men. The weaker men could not stand the eight-hour day so well as a twelve-hour day.

The CHAIRMAN: Do you think there is a considerable analogy between the position of the coalowner and yourself?

Witness: I do not know whether the coalowner would be able so easily to adapt machinery to coal cutting—I should say not.

Nevertheless, do you think there is any analogy at all?—The same

motive would actuate the coalowner as actuated the gas maker. He would try to introduce machinery and dispense with labour as far as he could. What I am afraid of is the tendency of labour becoming master. I wish them to have their rights; but I do not think it would be for the good of the country if we were under the control of Labour Unions.

Proceeding, witness said he thought the great obstacle to united action in the matter of the possibility of a general coal strike throughout the kingdom was the difference between the Federation and the north countrymen. It looked to him as if the whole coal industry of England might be under the control of one consolidated Union; and he did not like the look of it.

The CHAIRMAN: So that one of your objections to an Eight-Hour Bill is a wish to keep the enemy divided?

Witness: Well, I certainly do not want to see a general strike. That is not the main objection; but it is one. My view is entirely that of a consumer; I think the consumer is the principal party. If Parliament is going to interfere to strengthen in any way the power of combination on the part of the producers, it ought to make provision to protect the consumers.

What do you suggest?—I did not know it was going to take this turn. Some years ago Sir George Elliott made the suggestion for the combination of the whole coal trade of the kingdom. I then wrote a letter to "The Times" and suggested that, if there were such a combination, the consumer ought to be protected. My suggestion was shortly this: Something like an application to coal of the sliding-scale system that had been adopted in the case of gas companies—that the cost of raising coal should be ascertained and averaged throughout the whole kingdom, and that the emolument of the coalowners and of the miners should be dependent on the price at which coal was sold.

You are coming there to something near the nationalization of the industry?—Well, it was Sir George Elliott's suggestion, and mine was simply supplemental. I said, "if there were such a combination."

At any rate, you fear the power of the trade if it were combined. And you believe a restriction of the hours would be a step towards rendering the combination more likely?—I do.

Do you fear an effective monopoly price?—I fear something approaching a monopoly price. If Parliament does anything which tends in that direction, it will be a serious matter.

Mr. J. W. CROMBIE: Do you not think it would be much easier for Parliament to interfere when there is a legal eight-hour day than when there is no restriction in the hours?

Witness: I think it is a mistake for Parliament to interfere in any industry unless there is absolute necessity. I agree with you that if Parliament does interfere with the trade and, as a result of that interference, combination takes place, Parliament has a greater reason for interfering. But my own feeling is that the less Parliament interferes the better.

Witness proceeded to say that there would be no settlement of the capital-labour system excepting on the co-partnership system. In the case of the South Metropolitan Gas Company, it had succeeded beyond his wildest dreams.

The CHAIRMAN remarked that witness was puzzling the Committee. Did he wish them to do less or to go further?

Witness replied that they were on safe ground if they did not move. He agreed that gas consumers would ultimately be the people who would have to suffer from an increase in the price of coal. A penny on 1000 feet of gas was about £160,000 a year on the three London Gas Companies. If there was an increase in the price of coal, of course, the Companies would recover a little by putting up the price of coke.

The CHAIRMAN having asked what price of coal would bring in imported coal, witness replied that in 1892, when the strike of the Durham coalminers took place, his Company bought two cargoes of German coal; but with the freightage it came to 18s. a ton. In 1900 the price of coal was high; and they went to Philadelphia for some. This cost them about 28s. a ton. Therefore, he thought there was no possibility of foreign competition with British coal in this country for gas making, or for any other purposes as far as he could see. But he thought that foreign coal might come into competition with British coal abroad.

In reply to Sir R. GIFFEN, witness said: What we contend is that gaseous fuel is what London wants; and anything that makes this fuel costlier is a public disadvantage. The smoke nuisance would be mitigated by using more gaseous fuel.

The New Water-Works at Basingstoke.

As briefly mentioned in a recent number of the "JOURNAL," new water-works for Basingstoke have just been completed, at a cost of nearly £20,000, from the designs of Mr. F. R. Phipps, the Borough Engineer and Surveyor. The site of the new well and pumping-station is a little to the west of the railway station, on land quite isolated from dwellings; whereas the old well on the eastern side of the town, which had been in use since 1870, was near a number of old cottages. The new well is 60 feet deep in the chalk, with 35 yards of headings at the bottom; and it yields an ample supply both for the town and the railway station—the latter taking one-third of the total. The water is described by the County Analyst (Dr. Arthur Angell) as "a typical chalk water—one of the purest that can be obtained." The machinery, which is duplicated, has been supplied by Tangyes Limited, of Birmingham. The two well-pumps, 14 inches diameter, are of the three-throw type; their pumping capacity being 40,000 gallons an hour. The engines are of about 65 B.H.P.; but the actual work done by the pumps requires only about 40 H.P. The motive power for the machinery is supplied by suction-gas plant. The new works include a high-service reservoir at Cliddesden and new mains to the old reservoirs, which supply the low levels, and to the new reservoir, which has a capacity of 240,000 gallons.

The water undertaking of the Blackburn Corporation, after having been worked unprofitably for some years—during which the loss has been £75,000—is now reported to have earned a profit in the past year amounting to £2067.

GAS-WORKS EXTENSIONS AT MANCHESTER.

Last Friday, Major J. Stewart held an inquiry at Manchester, on behalf of the Local Government Board, respecting an application by the City Council to borrow £300,000 for the purposes of the gas undertaking. It is proposed to spend £102,000 on meters and stoves, £54,000 on mains and services, and the rest on the Gaythorn and Bradford Road works. The Committee propose putting up at the Bradford Road works a 10 million cubic feet holder, bringing the total storage capacity to 34½ million cubic feet; and by completing the retort-house at Gaythorn, the Committee will add 2¼ million feet to their manufacturing power, which at present is 25 million cubic feet per day.

Alderman Gibson, the Chairman of the Committee, gave evidence in support of the application. He said that during the thirteen years he had been Chairman, the number of consumers of gas had increased by 84,424, and the output by 58 per cent. In the last two years, the increase in consumption had exceeded 5 per cent. per annum; and the growing demand was such that the extensions suggested were absolutely imperative. Mr. J. G. Newbigging, the Chief Engineer, said that another application for further extensions would be required in five or six years' time—possibly in three years. The largest gasholder in the country was at East Greenwich; and the one they proposed erecting at Manchester would be the second largest. There would, in his opinion, be no risk in making a holder of 10 million cubic feet capacity. The illuminating power of the gas had been reduced; but nowadays it was a waste of money to make high-quality gas, for which consumers had to pay more. The Chairman had instructed him not to send out gas of less than 17-candle power. Judging by the large increases in output during the past two years, it was reasonable to assume that the growth of the department during the next ten years would at least equal that of the past ten. He estimated that the output in the year 1915, would be at least 7000 million cubic feet, with a maximum day's output of 35 million cubic feet. The largest output in 24 hours was on Dec. 12, 1905, when 28,810,000 cubic feet of gas was transmitted from the works. During last year this figure had been closely approached on two or three occasions, though the city had been free from heavy and continuous fog. Mr. F. A. Price, the Deputy-Superintendent of the Department, and others gave evidence.

Mr. Norbury Williams, the Elective Auditor, said it would be a good thing if the Committee would put a few words on their gas bills, giving people some hints as to the best form of burner to use, and how to deal with incandescent fittings. Mr. Lustgarten, who watched the proceedings on behalf of the Ratepayers' Association, briefly addressed the Inspector; and Mr. Joseph Hartley, a ratepayer, who opposed the application, put a few questions to the witnesses.

HUDDERSFIELD CORPORATION GAS UNDERTAKING.

Profits, the Price of Gas, and Workmen's Wages.

As briefly mentioned in the "JOURNAL" last week, the finances of the Gas Department of the Huddersfield Corporation came before the Town Council at their last monthly meeting.

The Gas Committee mentioned in their minutes that the Borough Treasurer had submitted a statement of the income and expenditure for the past financial year, which showed that the receipts amounted to £99,478, against £100,641 before, and the expenditure to £71,561, against £69,099. The amount to be added for interest and sinking fund was £13,685; making the total expenditure £85,246, compared with £83,006. The sum transferred to the depreciation fund was £10,545, and in aid of the borough rates £3686 (equal to 2d. in the pound). The depreciation account now stood at £31,161. It had been resolved that from the 1st of April the prices for the supply of gas should be as follows: For illuminating purposes, 2s. 3d. per 1000 cubic feet; and for cooking and heating stoves, through separate ordinary meters, 1s. 6d. per 1000 cubic feet. Also that prepayment meter consumers should have returned to them 2d. for each shilling paid into the meter, representing a reduction in price from 1d. for 33 cubic feet to 1d. for 36 cubic feet (which equals 2s. 3d. per 1000 cubic feet), and that the difference in price should be repaid to the consumer at the time of collection of the money, as at present.

In moving the adoption of the minutes, Alderman Jessop said the Committee had some assurance given them last year by the then Mayor that the grant of a sum in reduction of the borough rate was not to be taken as a precedent for the coming year. The same grant this year had been rather unwillingly made by the Committee, because they felt that they had some responsibility in trying to keep the finances of the undertaking in a sound condition. Little could be said to justify surplus profits from the gas undertaking being transferred to the relief of the rates. Some people had an idea that gas consumers were rated in this way two or three times over; and though the Committee did not like the consumers thus being milked, they were willing that the relief of a twopenny rate should be granted. He believed he said last year that a reduction in the price of gas should be fairly considered; and they were now able to further lower the charge for lighting purposes from 2s. 6d. to 2s. 3d. per 1000 cubic feet, as well as for gas used for cooking and heating. These reductions represented a further concession to the consumers of upwards of £7000 per annum; but inasmuch as the previous reduction of £10,671 only reduced the gas-rents to the extent of £889, owing to the increased consumption of gas of over 11 per cent. upon the year, the Committee did not anticipate that anything like a reduction of £7000 would be effected on the next year's income. They had, very justly he thought, been considering the question of increasing the wages of the workmen; and they followed the course they had usually taken—that of making an inquiry as to whether the workmen were paid less or more than similar workmen in other towns. They wrote to 33 large towns and obtained replies from 21, which justified them in increasing the wages of the stokers and others by 2d. per shift—*i.e.*, from 5s. 2d. to 5s. 4d. The depreciation and

contingency account, which was only commenced about three years ago, now amounted to £31,161. The Committee felt strongly on this question, and did not desire a repetition of the position of affairs of some 15 or 16 years ago, when the works were found to be in a state of exhaustion, and required an expenditure of £96,000, with only £9737 in the reserve towards it; involving a heavy overdraft at the bank at a high rate of interest for many years. It was, moreover, essential that in any process of manufacture such as that of gas a reserve fund should be available to meet any contingencies which were always liable to arise. The Committee had been unable to see their way to accede to the application of the Highways Committee for a reduction in the charges for street lighting. Personally, he was of opinion that the cost of the public lighting might be removed from the accounts altogether; but only recently the Council had increased the wages of the lamplighters, which the Committee had to pay. The Highways Committee should bear in mind that the Gas Committee were the largest ratepayers in the borough, and were contributing directly between £5000 and £6000 a year, which represented 1-33rd of the borough rate. The Gas Committee therefore claimed to be entitled to some consideration even from this aspect of the case. The capital outlay on the gas undertaking was £322,655. The original capital in 1872 was £130,336; so that there had been an increase of £192,319 in 25 years, or equal to £7693 per annum. Since 1897 everything had been charged to revenue account; and the Committee would continue to do this, as it was a safe and sound principle. The accumulated fund towards the redemption of the original loans was £86,573; but it must be borne in mind that the Committee had to pay interest and sinking fund upon the whole amount of the capital. There was no doubt that it would be necessary to have shortly a new gasholder and other plant. The Committee had discovered, while making inquiries about the men's wages, that the works were not quite up to date, and that exercising every economy possible, it was probable they would have another large outlay for machinery for the purpose of stoking the retorts. This was one of the things they were looking forward to. Therefore he was afraid the Committee had dangerously ear-marked their income for the next few years.

Mr. Shaw having seconded the motion, Mr. Whiteley asked whether the Chairman of the Committee could give some approximate estimates of the increase in the consumption of gas for business purposes. Alderman Jessop replied that it was not possible to give the exact figures; but the approximate quantity of gas used for motive power was about 40 per cent. of the total consumption.

BLACKPOOL CORPORATION GAS SUPPLY.

Report of the Gas Manager for 1906-7.

We learn from the report of Mr. John Chew, the Gas Engineer and Manager to the Corporation of Blackpool, that the year ending the 31st of March was one of continued activity; the output of gas having increased by 18 million cubic feet, making a total of 513 million cubic feet for the year. The gross profit was £28,379; and after deducting interest and sinking fund, there remains a balance of £17,183, against £17,208 for the year 1905-6. The reduction of 6d. per 1000 cubic feet to power and slot-meter users absorbed £1000, which would otherwise have been available. At the works, 50,000 tons of coal were employed, and a few hundred tons sold to the other departments. The covered coal-shed has been completed; and economies have been effected in various sections of the plant. Daily testings and analyses of the gases and products were made, and they showed the efficient working of the chemical plant, whereby the output of sulphate of ammonia is now 582 tons, valued at £6500. Some 24,500 tons of coke and 3000 tons of tar were also disposed of. In the course of the year, 472 customers were added, making 13,237; also forty lamps, making 2170, and two miles of main, making 89½ miles. Mr. Chew finds that some of the secondary mains are getting inadequate to meet the demand upon them. This is particularly the case in the older streets, where, in almost every house, cooking-stoves have now been adopted, where previously only gas for lighting was required; and it will be necessary to relay several this season. Generally, the mains are stated to be in good condition; the leakage of only 2½ per cent. being considered a low figure to maintain, notwithstanding the breakage of half-a-dozen mains in the year from the increased use of the steam-roller on the roads. Mr. Chew calls attention to the fact that, in consequence of the improved methods of gas lighting now in use, the flat-flame burner is being superseded by the incandescent burner; and he points out that under these conditions the illuminating effect now depends on the calorific power and flame temperature of the gas instead of on its illuminating value, as was previously the case. These altered conditions have, he says, led numerous gas authorities to lower the prescribed illuminating power, and reduce the price of gas, with material advantage to the consumer and to the undertaker.

Local Government Board Decline a Loan.—At the last meeting of the Briton Ferry Urban District Council, the Clerk reported that the Local Government Board had declined to sanction the water loan of £3000, as the rates stood so high (at 9s. 4d. in the pound) that the Board did not consider there was sufficient security. It was decided to invite tenders for the loan.

Objection to a Gas-Main Along a Footpath.—At the last meeting of the Down County Council, a report was presented by the Law Committee which set forth that they had had under consideration the action of the Gas Department of the Belfast Corporation in laying along the footpath on a portion of the Cregagh Road a main for the supply of gas. The Gas Department of the Corporation had commenced the work without notice, and had intimated that they intended to continue laying the main. The Committee had informed them that they could not consent, on behalf of the Council, to the pipes being laid anywhere except in the surface of the roadway itself, and they had directed the Solicitor to take such action as might be necessary to protect the interests of the ratepayers. The report was adopted.

PRIMITIVA GAS COMPANY OF BUENOS AYRES, LIMITED.

Progress in Spite of Competitive Drawbacks.

The Annual Meeting of this Company was held last Tuesday, at the London Offices, No. 153, Leadenhall Street, E.C.—Mr. H. E. JONES in the chair.

The SECRETARY (Mr. J. H. Bouwer) read the notice convening the meeting. The Directors' report and the accounts were taken as read.

The CHAIRMAN moved their adoption, and the payment of a final dividend of 4s. 6d. per share, making 7 per cent. on the ordinary shares for the year. In his remarks, he said that, as usual, the course of the Company had been successful. The reports from their Manager were to the effect that he was adding constantly to the number of consumers and laying additional services. The amount of gas sold during the year, however, did not show a large increase, because, although they had enlarged very considerably the amount of gas sold for fuel purposes (which was the direction in which their Manager was, following the practice of the best managed companies on this side, very properly bestirring himself), they had, in the short history of the Company, been steadily introducing, in opposition to the electric light, the incandescent gas-burner; and they had been sending burners and mantles out to their consumers by the thousand. The economy of these burners was so great as to diminish the amount of gas now used to light a room to one-tenth of what it was formerly. Therefore, if this decline in the consumption of gas necessary for lighting had not been accompanied by the development of the use of gas for heating purposes, the income would, under ordinary circumstances, have been diminished instead of having been maintained. In face of this, the Directors were able (they did not recommend an increased dividend) to make a very satisfactory disposition of the profits. They proposed the same dividend, and the placing to reserve of a sum which would bring the account up to £76,000. The direction in which, rather than add to the dividend now, the Board would like to go would be, if possible, to make a reduction in the price of gas. This, however, would be a very serious step to take as a single Company, seeing that there were two other important ones in Buenos Ayres. Whatever was done in this direction, must be through some collective action with the other two Companies; and such collective action was not so easily accomplished as might be imagined. Therefore the Board could not move so fast as they would wish. Perhaps there was no Board more anxious, or more willing, than their own to co-ordinate their work, in any shape or form, with the other Companies. At any rate, the shareholders would admit that the rate at which the Company had gone on in late years had been so rapid that there was nothing of which to complain. However, in not proposing an addition to the dividend recommended, the Board could strengthen the hearts of the shareholders by showing them a handsome reserve fund, contributed to by nearly £15,000 in the past year. Thereby the operation recommended at the last meeting, the balance of the account "Discounts on debentures and expenses of issue" £54,093, to which the item had been reduced in the accounts for 1905, had been cleared away. The profits were slightly above £8000 less than in the previous year; this being due to two or three facts which he was sure, when brought to their notice, would be understood by the shareholders. In the first place, the cost of coal was going up, and had been going up for some time past. They would have to meet this in the coming year; and it would be a matter of grave concern for the Directors. The extra cost of coal in the year under review was £9000; but, owing to the rise in the value of the coke, and also of the chemical products of gas manufacture, the increase in the cost of coal was reduced, so that the net cost was only £2500, or rather less. But the shareholders would remember that the year before last, there were some difficulties in the labour market of Buenos Ayres; and employers of labour had to alter their relations with the men. There was not only the new regulation of the Government as to working on the seventh day, but there were the final rearrangements with the men as to remuneration. The Board had expected these would cost them a great deal more; but the cost had only been some £3000. This was due to the very creditable arrangements made with the men by their local Engineer (Mr. Browne). Then, again, they had been reducing the price of gas very heavily to those who used it for fuel purposes, because in this direction the Board believed lay business with which the Electric Light Company could not possibly deal. That had reduced the income by some £2684; but as that was only an instalment towards a general reduction, he thought the shareholders would look upon the figure with great satisfaction. Spite of these decreases in profit, the Directors recommended the payment of the full dividend, and the carrying of £14,736 to the credit of the general reserve account. In October an interim dividend of 2½ per cent. (or 2s. 6d. per share) was paid, amounting to £10,000; so that it would be seen the amount placed during the year to reserve account was nearly equal to 4 per cent. upon the ordinary capital. The Board had had the fullest particulars from the Company's Manager as to the amount of work done during the year. Some 5½ miles of new mains had been laid; making the total 232 miles. Seeing that their Company was only one out of three, this would give some idea as to the extent of the city they had the honour of partially lighting. Then 1⅞ miles of mains had been relaid with much larger pipes; giving more than a 50 per cent. increase. Some 3 miles of mains had also been examined, owing to the requirements of the authorities. Nearly 1500 new services had been laid; making the total number 44,743. Additional meters to the number of 1047 had been fixed; making the total 25,018. In these latter figures would be seen one of the drawbacks to the competition of gas in Buenos Ayres; and it was an argument for amalgamation, if it could be accomplished. Although the Company had nearly 45,000 service-pipes laid, they had only meters supplying gas to the number of 25,000; the other 20,000 services were lying idle, or perhaps the houses were being supplied by one of the other Companies. An additional 1000 stoves and cookers had been put in; and something like 650 high-power incandescent lamps had been installed. One special development that had taken place might interest the shareholders. That was the use of water-heating arrangements in which gas was used. The people of Argentina were a very cleanly people, and indulged very frequently in baths. And these means for heating water

for baths were being fixed at a fast rate; and a large number had been sent out. He mentioned this as an additional feature in the use of gas for heating purposes. Speaking of the working during the year, which had been technically excellent—the best production of gas had been accomplished per ton of coal, per retort, and per unit of labour—the local Director concluded with these words: "The whole of the staff in my opinion have worked thoroughly well in the interests of the Company." He (Mr. Jones) had pleasure in moving the adoption of the report and accounts, and the declaration of the dividend recommended.

Mr. JOSEPH KINCAID seconded the motion; and it was unanimously carried.

Proposed by Mr. KINCAID, and seconded by Mr. W. W. PHIPPS, Mr. Jones (who retired from the Board by rotation) was re-elected, as were also the Auditors (Messrs. G. A. Touche and Co.), on the motion of Mr. RYDER, seconded by Mr. THOMAS.

Resolutions were cordially passed, thanking the Chairman and Directors, the local Directors, Mr. Browne (the Engineer), the Secretary, the staffs, and the workmen; and with these acknowledgments of services, the proceedings terminated.

BUENOS AYRES (NEW) GAS COMPANY, LIMITED.

Promising New Schemes—A Good Increase in Consumption—Resignation of Mr. Dougall—Additional Dividend or Reduced Price.

The Annual General Meeting of this Company was held last Wednesday, at the London Offices—Mr. J. C. IM THURN in the chair.

The SECRETARY (Mr. J. M. Macmorran) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN said that Mr. Heseltine, who usually presided at the annual meetings, and fully intended doing so on this occasion, was, unfortunately, at the last moment unable to do so; and he had asked him (Mr. im Thurn) to take his place. It was his privilege, therefore, to present the report of the Directors and the accounts for the year 1906; and these he felt sure would be satisfactory to the shareholders. It would be observed from the report that there was to the credit of the revenue account the sum of £84,156, made up of £63,606 profit for the year, and £20,550 brought forward from 1905. This profit showed an increase on that of last year, in spite of the fact that outward freights were adverse, and the labour market at Buenos Ayres by no means favourable. The Directors had appropriated the £84,156 in the following manner: To the 4 per cent. debenture interest, £10,000; to the interim dividend of 6s. per share, £18,000; to the renewal and contingency fund, £5000; and, after writing off £2112 2s. 3d., the agreed annual charge from discount and expenses *re* issue of debentures, they proposed, subject to the consent of the shareholders, to pay a final dividend of 8s. per share, which, with the interim dividend, made a total dividend of 7 per cent. (or 14s. per share), free of income-tax. This would leave £25,043 to be carried forward. Out of the year's revenue, £19,756 had been expended on the upkeep of the works, mains, &c. The greater part of the inclined retorts had been reset; and new exhausters of a much larger capacity than the old ones had been put in. In the course of the past ten years no less than £167,000 had been spent out of revenue on maintenance of the works and plant. Turning to the balance-sheet, it would be noticed that the reserve and other contingency funds amounted to a little over £100,000. These reserves were invested in shares of the South Barracas (Buenos Ayres) Gas and Coke Company, Limited, earning at present 5 per cent. per annum. The total issued capital of the South Barracas Company amounted to £150,000, which was all held at present by this Company. It might be objected, perhaps, that part of the recently issued capital was invested in shares earning 5 per cent., whereas 7 per cent. was paid on the remaining capital so issued. But many of the reasons for holding this stock were given at the last annual meeting; and he would further point out that the future of the South Barracas Gas Company was, in the Directors' opinion, one of great promise. As mentioned last year, arrangements were then in progress for the development of the water supply in that suburb. He was now able to inform the shareholders that the South Barracas Gas Company had since secured the water concession for the districts served by that Company. This concession, when carried out, would, in the judgment of the Directors, greatly develop the districts in question; and, in addition to being an undertaking of great promise as a valuable dividend-earning concern, it would do much to materially increase the earning power of the South Barracas Company. He thought therefore that it was a matter for congratulation that the reserves of the Company should be invested in a stock which not only paid 5 per cent., but was one that would continue to be of material aid to the parent Company. On the other side of the balance-sheet, it would be observed that the amount of discount and expenses *re* issue of debenture stock still outstanding was £2112. This sum would be written off at the end of the current year—thereby freeing the profit and loss account in future to this extent. Their investments figured at £154,541; and of this £150,000 was represented by the South Barracas Company's shares—the remaining £4541 being principally made up of the Company's holding in the Bahia Blanca Gas-Works (Construction) Syndicate, Limited. With reference to this, he had to report that Messrs. J. C. im Thurn and Sons, with the aid of the officials of the Company in Buenos Ayres, had obtained a permit from the Municipality for the erection of a gas-works at Bahia Blanca, which was an important and rapidly-growing port south of Buenos Ayres. A Construction Syndicate was formed in which this Company took an interest to the extent of £5000; receiving for its services in aiding to secure the permit 3500 "B" shares (being part of a total of 14,000) at a cost of 1s. each, which were to participate in the profits of the Company to the extent of one-half of the surplus profits after 7 per cent. had been paid on the ordinary shares. This investment, the Directors considered, would be of great value to their Company, as Bahia Blanca was undoubtedly one of the most rising cities in Argentina. Its port and position were such that it promised to become the great shipping centre of the southern portion of the Argentine Republic. The Board looked forward to great developments in the uses that would arise there for gas, not only for illuminating purposes, but for power and cooking. The Syndicate was formed in June last; and in spite of the labour troubles so prevalent there, as elsewhere in the River Plate, the construction of the works, under the guidance of the able and energetic Engineer, Mr. Arthur Gibson (sent there specially for the purpose), had advanced so rapidly towards completion that hopes were entertained of being able to supply gas in July next. In 1906, the sales of gas increased by 9·46 per cent. on top of an advance of 6·33 per cent. the previous year; and in the present year so far the increase had not only been maintained but exceeded. Private lighting, cooking, heating, and public lighting were all increasing, notwithstanding the competition of the electric light. During the year, the last of the public lamps had been converted from open-flame to incandescent burners; and this had been done entirely out of revenue—a charge which would, of course, be non-recurrent, for the Company had not now a single public lamp with an open flame in the whole of the streets served by them. The number of lamps had increased by 304; making a total of 7425 lamps. During the year, a coal-handling plant had been installed, which enabled the Company to take delivery in their coal-stores at the rate of 350 tons per day of eight hours. This would represent a very great saving in both labour and wages. The Board regretted to have to inform the shareholders that their Engineer (Mr. Dougall) had to resign—the climate not suiting him. The necessary steps to replace him were now being taken by the Board. Mr. Frederick C. im Thurn, one of the Directors, made a visit of some duration to the Company's property in Buenos Ayres last year, in order to inquire into many important matters appertaining to the welfare of the Company. He received every assistance from the Local Committee, Mr. Obarrio, the Manager, and the staff generally; and his report had been, in every way, of great value to the Board. In conclusion, the Chairman expressed the opinion that, owing to the constant and increasing growth of the City of Buenos Ayres (the population of which had now reached 1,100,000), and the continued prosperity of the Argentine Republic, the prospects of the Company were very favourable. He was pleased to say that the relations of the Company with the Municipality and the other authorities continued to be most cordial. He formally moved the adoption of the report and accounts, and the declaration of a dividend at the rate of 7 per cent., free of income-tax, 3 per cent. of which had been paid, leaving 4 per cent. to be distributed.

Mr. ROSS PINSENT seconded the motion.

Mr. BENNETT inquired whether any great length of time would elapse before the South Barracas Water-Works were completed.

Mr. NEWTON asked whether all the new issue of capital as paid up would be required for the development of the gas-works.

The CHAIRMAN replied that the plans for the water-works were not yet agreed with the Government. They could not say how long it would take to build the works; but two years were given by the concession. There was an absolute necessity for these water-works on the south side of the city, for the water there was so very brackish. As to Mr. Newton's question, the capital was all required. The South Barracas concession belonged to the Company. It was not, however, proposed to build the water-works with the capital of the Company, but to reserve as many advantages as possible for the shareholders.

The motion was unanimously carried.

Mr. ROSS PINSENT proposed the re-election of Mr. Frederick C. im Thurn as a Director of the Company; and he referred to the visit that gentleman paid to Buenos Ayres last year, to look into the Company's interests, and to make various arrangements. The Board were very much indebted to him for his assistance.

Mr. ROBERT NESHAM seconded the motion, which was heartily adopted.

Proposed by the CHAIRMAN, and seconded by Mr. F. C. IM THURN, Mr. Ross Pinsent was also re-elected.

The Auditors (Messrs. Turquand, Youngs, and Co.) were reappointed.

Mr. F. C. IM THURN proposed a vote of thanks to the Local Committee, and the staffs in Buenos Ayres and London. In his remarks, he acknowledged the great help received from the heads of all departments while in Buenos Ayres—from the Manager downwards. Answering a question, he said the Company did not suffer much from the labour troubles; but there was half-a-day's strike at the works while he was in Buenos Ayres.

Mr. ROSS PINSENT seconded the motion, which was agreed to.

Mr. H. E. JONES proposed a vote of thanks to the Chairman and his colleagues. The words "labour troubles" had been mentioned; and no one knew better than he did how much the labour market in Buenos Ayres had been disturbed—not only as to rates of pay in all services, public and private, but also with regard to the enforcement of the seventh day's rest. He knew something of the difficulties of administering a Gas Company in Buenos Ayres, where they had three in competition, and an extensive electricity supply. He was glad to see one thing, and that was that the Directors had not fallen into recommending an additional dividend; the present condition of things demanded consideration rather for reductions in the price of gas. He trusted that the Board would refrain from any addition to the dividend until they had met the public want.

The CHAIRMAN, in his reply, said the Board quite concurred with Mr. Jones in the policy of not increasing the dividend under existing circumstances. He believed they were in this matter acting in the best interests of the Company.

The meeting then ended.

Gas-Meter Testing in Middlesex.—The Middlesex County Council have just issued their annual report in regard to the gas-meter testing-station. During the twelve months ended the 31st of March last, 73,591 meters were tested, and the fees received amounted to £2244; the figures for 1906 being 79,533 meters and £2371 for fees. The expenditure in connection with the station amounted last year to £1424; leaving a balance of £820 in favour of the County Council. Of the meters received, 71,358 came from the makers, and 2640 of them were rejected. From the gas companies and consumers 2233 were received, of which 427 were passed and 1806 were rejected.

A GAS COMPANY AND ELECTRICITY SUPPLY.

The shareholders of the Ascot District Gas and Electricity Company held an extraordinary meeting last Wednesday—Mr. JOSEPH MANWARING in the chair—for the purpose of considering a resolution authorizing the Directors to raise additional capital by the issue of £8000 of 4 per cent. perpetual debenture stock and 1000 7 per cent. ordinary shares of £10 each—the larger part of the money being required for the establishment of electricity works.

The SECRETARY (Mr. W. A. Schultz) having read the notice convening the meeting,

The CHAIRMAN formally moved the resolution. In doing so, he said it was, of course, within the knowledge of all the shareholders that the Company had obtained powers, under the Ascot District Gas and Electricity Act, 1906, to distribute electricity in the Company's area of supply. The Directors had for some time past had under consideration the question of the desirability of putting into force the powers with which the Company were entrusted. The Board called in the services of Messrs. Handcock and Dykes, Electrical Engineers, of Victoria Street, Westminster, S.W., to advise them generally with regard to an electricity scheme. Mr. Dykes had on several occasions visited the neighbourhood, and had made reports to the Board. He therefore thought he could not do better than quote some passages from Mr. Dykes's reports, which would give a far better grasp of the situation than could any words of his own. On Dec. 5, Mr. Dykes reported :—

I have carefully considered the prospects of an electric supply in your district, and the probability of its proving remunerative for your Company to combine the supply of electricity and gas. I believe that you have already had before you the views I put forward, and the scheme I outlined in my proof for evidence before the Board of Trade and before the House of Commons Committee; and I may say generally that further reflection has not caused me to modify in any material details the position I then took up. It is certain that there is a demand for electric current in the district, as is evidenced by the number of houses already wired; and it is equally certain that, if the supply is not given by yourselves, then some outside body will, before very long, step in and compete seriously with your gas undertaking. In such an event, not only would you lose a certain number of your present consumers, but from experience in similar districts, we can safely predict that you would be forced to lower your present price, so that you would be getting less from the consumers you still retained; and an electric light company coming into the district would of necessity be forced to canvas most energetically for business, and to initiate a competition which could not fail to prove very irksome to you. I think that before long the combined revenue from the gas and electric undertakings would be well in advance of that from gas alone, as there are a number of residents who are never likely to take gas, but who will readily take a supply of electricity. This tendency is likely to become more marked still as new houses are erected. Considering the undertaking merely from the point of view of an Electric Light Company, an amalgamation of the two concerns presents obvious advantages. You have a suitable site already, you are in touch with the district, you have a staff of men to read meters and maintain mains, and you have the necessary clerical and management staff. In addition, as a by-product from your present works, you have the coke necessary for generating cheap gas for the gas-engines driving the dynamos. It seems clear therefore that, if an outside electric light company has any chance of doing profitable business in your district—and it is evident that some of them are persuaded that they have—you yourselves are in a much more favourable position. I am aware that the canvas you have made among your consumers has only resulted in obtaining some eighteen promises to take a supply of electricity; but experience has shown, time and again, that the results of such a canvas are always negative. People will not bind themselves; and in my own practice I have frequently had mains loaded up as soon as laid, although a previous canvas had not been successful in obtaining a single promise. This, I think, will show the wisdom of the Company's decision to proceed with the installation.

Since the last meeting of shareholders, the Directors had (said the Chairman) further consulted Messrs. Handcock and Dykes, and had obtained tenders for all the plant and mains necessary. These tenders, which the Directors proposed to accept as soon as the necessary capital was issued, amounted in all to £14,589 10s. With fees and contingencies, therefore, the capital likely to be required was £16,048. The Directors, however, did not propose to lay mains in the whole of the compulsory area at first, but to confine the operations of the Company to Sunninghill and Sunningdale, where there was likely to be the most immediate demand. Messrs. Handcock and Dykes said: "Judging by actual experience in similar districts, this area should, before long, yield a lamp connection of 8000 8-candle power lamps (or their equivalent in higher candle power lamps), with a demand of 80,000 units per annum." They estimated the revenue on this would amount to £2368, and the running costs to £868—leaving a balance of £1500 profit. This result, however, would not be reached until the works were fairly established, and could not be looked for in the first year or two. Still a little over one-half of this profit would suffice to pay a dividend of 5½ per cent. on the capital outlay; and when this was exceeded, the balance would go to assist the dividend on the remaining capital. The Directors were asking for power to raise £18,000 of capital, £2000 of which would be required to reinforce the gas capital; and the remainder would be wanted for the electrical undertaking. It was proposed to put out about one-half of this capital early in June, and the remainder in October or even later.

Mr. ALFRED KITT seconded the motion.

Mr. DYKES, replying to Mr. F. R. Smith and Mr. Samuel Spencer stated that the fixed electrical plant would be brought into use as soon as erected. Out of the total expenditure, roughly about £9000 would be for electric mains and services, and the remainder for the fixed plant. He expected the plant would be ready for operations about September. In his estimates, he had taken the price of copper at about £120 per ton; but, under a sliding-scale, if it was lower when the contract was placed they would get the benefit of the reduction.

Dr. STRONG inquired whether it was intended to make the installation serve the whole district at once, or to go forward with it by degrees. He strongly advocated the latter course, in view of the fact that the canvas was not at all favourable to the electric light. A further £18,000 of capital meant nearly £1000 to pay a dividend of 5½ per cent. But he appreciated that, to a certain extent, the Directors were in a cleft-stick. If the Company had not undertaken to supply electricity, then another company would have stepped in, and injured their prospects as a Gas Company.

Mr. DYKES explained, with regard to the expenditure of capital, that arrangements were only being made at present for putting down mains in a restricted area round about the station—that was to say, in the pick of the district at Sunninghill, Sunningdale, and Ascot. The plant would be sufficient to generate twice the number of units allowed. They had estimated for 80,000 units; but the plant would be able to deal with 160,000 units. The price per unit at the outset would be 7d.; and its reduction would be a matter of policy for the consideration of the Directors.

Mr. SPENCER remarked that what the shareholders were called together to do that day arose from what had been done before. They were committed to the electricity undertaking; and the sooner they got to work now the better.

It was mentioned that news had been received, through wiring contractors, of further customers for electricity.

The motion was unanimously carried, as was also one authorizing the Directors to issue the further capital by tender or public auction.

SOUTHAMPTON GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Wednesday—Captain A. J. CORSE-SCOTT, J.P., in the chair.

The SECRETARY (Mr. E. W. H. Eady) having read the notice convening the meeting, the report and statement of accounts, some figures from which were given last week (p. 317), were presented.

The CHAIRMAN, in moving the adoption of the report, said his duty was a pleasant one, for it showed that the profit available for distribution was £15,847. Of this sum only £12,588 was required for the payment of maximum dividends. There was, therefore, a balance of £3259 remaining to be carried forward. It had been a considerable pleasure to him since he had had the honour of being their Chairman that at each half-yearly meeting he had been able to announce additions to the reserve fund, amounting in all to £24,000. On the present occasion, the Directors had not carried any amount to the fund; and the proprietors would like to know why this course had been adopted. The reply to this question led him to the important point of the increased cost of coals. The stockholders were doubtless aware that the cost of coal of every description had very greatly advanced during the past two years. The Directors had, fortunately, made an excellent contract in 1905; but since that time several important rises in the cost of coal had taken place, which had affected nearly every other gas company throughout the kingdom. During this period the Company were happily in a position of immunity from these increased charges. The time had now come, however, when they would have to pay considerably more for their coals. This being the principal item of a gas company's expenditure, the Directors had thought it wise, in order to prepare to meet the extra call on the revenue resources of the concern, to carry forward the whole of the available undivided profits, amounting to £3259. They were in hopes that the present exorbitant charge for coal would not be permanent; and as the Company possessed at present a reserve fund of £48,196, the Board thought it the better policy to await the turn of events, rather than at once deprive the consumers of the great advantage they at present enjoyed of being supplied with gas at a remarkably low price. He was glad to say that the whole of his remaining remarks would be of the most satisfactory and encouraging character. The increase of 4¾ millions cubic feet of gas sold during the half year ending Dec. 31 last, compared with the second half of 1905, was very gratifying. No less than 500 new consumers on the prepayment meter system had been added during the half year; so that there were now 14,000 of these consumers, compared with 9000 on the ordinary system—making a total of 23,000. Considerable additions had been made to the numbers of both gas-fires and cooking-stoves let on hire by the Company; and the inspection and maintenance department, for keeping incandescent gas-burners in perfect order, had supplied a popular need. The Directors quite recently made one of their periodical inspections of the gas-works, which were in thoroughly good condition, and in excellent working order. He concluded by congratulating the stockholders on the continued prosperity of the Company.

The DEPUTY-CHAIRMAN (Mr. J. C. Moberley), in seconding the motion, referred to the small amount of bad debts (£171), which, he said, was very satisfactory, and reflected credit upon those who were deputed to carry out the work of collection.

The motion was at once carried unanimously, as was also one for declaring the maximum dividends.

The retiring Directors (Captain Corse-Scott and Mr. A. W. Oke, B.A.) and Auditor (Mr. A. H. Cobbold) having been re-elected, a vote of thanks was accorded to the Chairman and Directors.

Mr. FOLLIOT DUNSFORD proposed that the best thanks of the meeting be given to the Secretary, the Manager, and the staff. He remarked that it was evident they all worked together very amicably; and to this was no doubt due in a great measure the progress of the Company.

Mr. S. DACOMBE seconded the motion, and, as a shareholder of some thirty years' standing, said he could bear witness to the work that was done on behalf of the Company by the staff generally.

The motion having been carried unanimously,

Mr. EADY returned thanks on behalf of the staff in his department, and testified as to the way the work had been carried on. As the prosperity of the Company increased, so also did the work; but he could say that the staff did, and would continue to, exert themselves in the interest of the undertaking.

Mr. S. W. DURKIN (the Resident Engineer and Manager) also briefly returned thanks, and alluded to the good understanding existing among all in his department, and their readiness to do their very best for the Company.

The meeting then terminated.

BOMBAY GAS COMPANY, LIMITED.

A Defaulting Collector.

The Ordinary Meeting of this Company was held last Thursday, at the London Offices—Mr. H. E. JONES in the chair.

The SECRETARY (Mr. A. Dickson, jun.) read the notice convening the meeting; and the report and accounts—noticed in the "JOURNAL" for the 23rd ult., p. 256—were taken as read.

The CHAIRMAN remarked that, in a rather long and varied experience, his position there was perhaps unique—that of being, with the exception of Mr. Penny, the only officer, he might say, who had been for any length of time in the service of the Company. The last few months had been specially marked by change. They had lost their old Secretary, who retired; and as, curiously enough, the Senior Auditor resigned at the same time, and Mr. Perrins wished to swell the retiring allowance given him by these fees, the Board at once appointed him Auditor. The Company had thus a new Secretary and a new Auditor. In the special circumstances, it had been particularly advantageous for the Directors to secure the services in the former position of a gentleman who was himself the son of a well-known Chairman of a Gas Company, and who had gained a valuable experience in similar duties as Secretary of the late Kent Water Company, which was now absorbed by the Metropolitan Water Board—unfortunately for him, but very fortunately for the Bombay Company. Mr. Dickson was able to come to their assistance just at the time when, as the report said, they were specially in want of a young and energetic Secretary, because circumstances which had transpired made it particularly necessary for them to have an officer who could occasionally go out to Bombay. Mr. Perrins's age forbade him undertaking this kind of duty. This accounted for the changes he had referred to. Then they knew how death had dealt with his old colleagues, so as to render the larger part of the Board comparatively new. There was also another feature. They had got a new Manager of their works in Bombay; and he congratulated them as much on the appointment of that gentleman as he did on the choice of Mr. Dickson as Secretary, because he had known Mr. Burch all his life. He was the son of Mr. James Burch, the Secretary of the Canterbury Gas and Water Company; and he was one of his (the Chairman's) pupils years ago. He knew him to be of an extremely high character, and thoroughly competent. Mr. Burch had undertaken the duty at a time of special extra work; but he was glad to say that his efforts had been successful in several directions—not the least in formulating regulations in regard to the accounts and the collecting of money which were of great importance. The accounts showed a profit of £16,958, as against £16,005 for the previous year. This was a net increase of £953. They had effected some very considerable improvements, and set aside sums for maintaining the true value of the undertaking. They had extended the mains and laid a large number of new services and fixed additional meters. They had appropriated this year something like £1800 to maintain the capital value of the undertaking. Therefore, including this addition of £953, there was an addition of £2774, if the items he had given were added together. They were able to report a satisfactory increase in the sale of gas for private and public purposes, and also that there was an improvement in the sale value of residuals; and therefore they were in a position to recommend, without any reserve, the increased dividend—the shareholders would recollect it was increased a little time ago—which was named in the resolution, of 3½ per cent. for the half year, making 7 per cent. for the year. He had told them what was the pleasant side of the accounts; and he was obliged now to refer to an element which had given the Directors a large amount of labour and a great deal of anxiety. The profit he had told them about would, as mentioned in the report, have been larger still but for the defalcations of a native collector, the whole of which had been provided for out of the revenue of this year. When, however, he said the whole of it, he was bound to tell them that there were still a few hundred pounds of outstanding debts which they looked upon as doubtful until they were absolutely collected. But the amount involved was not a large one. Bad debts on this occasion figured at £2683, whereas last year they were only £69. This was the loss which the Directors had actually ascertained by Mr. Dickson going over to Bombay for the purpose. For some time past the Board had not liked the position. They had sent special letters to their Auditor out there, and to the Manager, and viewed with great concern the increase in the outstanding debts. They were, however, assured by the Manager that the bubonic plague (which he wrote about very frequently—more frequently than was quite fair under the circumstances) accounted for the moving out of Bombay of a great many influential people; and that this prevented the collection of the money. When the matter was thoroughly investigated, which followed the retirement of the late Manager from sickness—he was very unwell at the time—they could see there was probably some irregularity. These debts and liabilities had been looked into, and had been found to arise really from a system of collection which was of long-standing and very successful until the last three or four years. The father of the late collector was for about 30 years a most conscientious and painstaking contractor for collecting these amounts. It had been so long a custom that the Board had forgotten to criticize the question of how far it was expedient and wise to collect sums by one agent, instead of having their own collectors. They had, however, now arrived at the conclusion that this system must come to an end. They had therefore appointed their own collectors, who were no longer agents, but were simply the servants of the Company. The shareholders would probably ask how far this matter was secured against, because it was the duty of the Directors to see that their officers who collected money gave security. The Board had such a system; and there was security given by this particular man. For some reason best known to himself, their then Manager—though he was reporting to the Board how right it was to have these securities—forgot, or overlooked, or permitted the securities to fall out. They did hold some collateral securities, but these were not very great. He had tried to tell the shareholders about this matter as much as it was right for them to know—perhaps more than it was discreet for him to say. The whole story had only recently been brought to the Directors' knowledge by the successful efforts of Mr. Dickson, who had worked like a slave in this matter, and of whose devotion he could not speak too highly. How far they might take steps of a legal character to bring those parties to justice who had so woefully abused the confidence of the Directors, he did not know; and he must ask the shareholders to bear in mind that these things were under consideration, and not press for further particulars. But any shareholder who really felt anxious to know more, was quite welcome to inquire at the office. Large profits had been made by the reduction in the price of gas which he brought under their notice two years back; and the whole business was so satisfactory that personally he (Mr. Jones) did not attach very much importance to this defalcation. But as an old Manager, he was grieved and ashamed to have to tell the shareholders that the confidence of the Board could be so abused, and that a miserable loss like this should fall upon them. He thought that the amount for bad debts last year—£69—was very insufficient; and that a considerable portion of this money would be debts kept on the books a little too long and much of it not recoverable. But, at the same time, there was a large residuum of money lost by fraud and negligence; and he was ashamed of it. He was sure the shareholders would give the Board their sympathy. They were 5000 miles away. They were watching the matter; and the plague in the first instance, and the illness of the Manager next, were made excuses, until they found a great deal of the money had been lost. Now, however, they had instituted a new system, and had made arrangements with the Secretary to visit Bombay from time to time, which would be better than any other check they could devise. The gentlemen who had signed the accounts were Chartered Accountants in Bombay, and one of the leading firms, he believed, in that part of the world. He concluded by moving the adoption of the report and accounts and the declaration of a dividend for the half year of 3½ per cent.

Mr. W. G. BRADSHAW seconded the motion; and it was carried unanimously.

Proposed by the CHAIRMAN, and seconded by Mr. CHARLES HUNT, the retiring Directors (Mr. Bradshaw and Mr. Louis Penny) were re-elected.

The CHAIRMAN, alluding to the services of the late Secretary, Mr. Perrins, said no one could be more competent and helpful to the Board than he was; but they could not resist his appeal when he asked for rest. They were able to fix such terms for his retirement as were acceptable to himself; and when the vacancy occurred in the Auditorship, they were glad to temporarily fill it by appointing Mr. Perrins to the position.

Mr. S. SPENCER then proposed, Mr. WILLIAMS seconded, and it was agreed, that the Auditors (Mr. S. Gore Brown and Mr. J. Hill Perrins) be re-elected.

Mr. SPENCER proposed a vote of thanks to the Board for the manner in which they had conducted the business under the very difficult circumstances in which they had been placed. He did not think that any more need be said of that. The matter might be left to the Directors to settle.

Mr. WILLIAMS, who seconded, said it was extremely difficult to avoid a thing of this kind. When a man intended to rob one, even if there were all the checks in the world, he was likely to succeed, though the thing might be theoretically impossible.

The CHAIRMAN acknowledged the vote, and suggested the addition of a word of encouragement to the officers—the new Secretary, the new Engineer, the Assistant Engineer (Mr. Lane), and the other officials, all of whom had worked with great fidelity.

Mr. SPENCER, in seconding, hoped the progress of the Company would be much more rapid than had been the case in the past. He thought there was every indication of this being the case.

The CHAIRMAN said the Manager in Bombay had started on new lines, and was increasing the sale of gas. They were securing additional consumers, and fitting them up with appliances corresponding with the developments that had taken place on this side. There was every hope that this would add to the prosperity of the Company.

The SECRETARY returned thanks on behalf of himself and the other officers for the vote. So far as the Manager and himself were concerned, the sphere of their operations had only extended over the second half of the financial year; but they had been unremitting in their efforts to serve the Company to the best of their ability. They had devoted much time and consideration to devising a system of control over the twelve collectors in Bombay; and they felt assured that in the future, this scheme being carried out, there should be practically no opportunity for the appearance of anything like the figures shown in the accounts as defalcations which had occurred in the past. He hoped that, with their joint efforts, the Company would for a very long time enjoy immunity from such misfortunes as had now happened.

This concluded the business.

Ironmongers and the Sale of Gas-Stoves.

In the "Ironmonger" some time ago, particulars were published of an agreement come to between the Croydon Gas Company and the local ironmongers respecting the sale of cookers, stoves, and other appliances operated by gas. In the current issue it is reported that the Company are of opinion that the arrangement had been of great benefit to them; but whether the ironmongers have profited as much as they might have done by the compact seems to be less certain. "But," says our contemporary, "the ironmongers are regarded by the Company as valuable allies, having many opportunities for directing the attention of customers to the advantages of gas for heating, cooking and lighting. The feelings of jealousy which the ironmongers might have been disposed to nourish at one time are said to have disappeared; and the Company readily acknowledge the assistance rendered by the ironmongers putting them in touch with consumers. It is stated that the Company are afforded greater opportunities than formerly for the supervision of fitting work; and that, as a consequence, the number of complaints received as to defective installations has decreased largely of late. On the whole, the Company consider that the experiment has proved thoroughly satisfactory to themselves; and they believe that the ironmongers are equally content with it."

GAS SUPPLY IN AUCKLAND (N.Z.).

According to the report presented to the shareholders at the 45th annual meeting of the Auckland Gas Company, which was held on the 4th of February, the profits realized in the year ending the 31st of December last amounted to £35,037. The Directors recommended a dividend for the second half of the year of 8s. per share, amounting to £13,923, which, added to the interim dividend paid in July, made a total of £27,845—leaving a surplus of £7192. In moving the adoption of the report, the Chairman (Mr. Thomas Peacock) stated that the quantity of gas sold in the year was 373,453,000 cubic feet, against 342,341,000 cubic feet for 1905—being an increase of 31,112,000 cubic feet, or 9 1 per cent. The total expenditure was £73,708, or £5587 more than in the previous year. There was received from the sale of gas £83,811, compared with £81,774—an increase of £2067, which would have been greater on the basis of the price charged in 1905; but considerable reductions were made, and these took effect during ten months of the year. In the matter of residuals, there was an increase in the sales of £2500. The balance carried to the credit of the net revenue account was £35,037, against £36,550—a decrease of only £1513. In connection with the works, the Chairman stated that more than 9 miles of additional mains had been laid, and further extensions of trunk mains had been found necessary and were being proceeded with. In order to meet the increasing demand for gas, steps were being taken to complete the whole of the retort-settings originally contemplated in the new retort-house. In regard to automatic machinery, in addition to the coal conveyor and distributor previously put up, there had been erected and brought into operation the new auxiliary coal-conveyor for supplying the retort-house hoppers. The new coke-conveying plant had also been completed and brought into use. The Board having been impressed by the efficiency and economy connected with the mechanical stoking of retorts, they ordered a complete plant on the De Brouwer principle. This had been recently started, and the results so far had been quite satisfactory. In view of the rapid expansion of Auckland and its suburbs, and the steady increase in the demand for gas, the Directors had found it necessary to look beyond the supplying of gas for the more immediate future, and to consider the question of further extensions of the works. After considering the matter in all its aspects, the Board decided that it would be in the best interests of the Company to purchase the property adjoining the works, and entered into a contract for excavating it. The desirability of the Company holding large coal supplies had been further exemplified during the year by the strike of coal miners at Newcastle. The present coal-store, when enlarged as intended, would have a capacity of 8000 tons. Not only had the Directors been making additions to the works in Auckland, but at Devonport fresh retorts had been built, the new gasholder had been completed, and the coal-store enlarged. A site had also been purchased, and a new branch office built in the same borough. At Onehunga an additional gasholder had been erected. In order to meet the cost of these works, the Board issued the balance of the £60,000, authorized to be raised on debentures, amounting to £26,600. In conclusion, the Chairman said that, speaking generally, while it was gratifying to know that the Company's business continued to increase, it must be borne in mind that a similar condition of things existed throughout the gas world. The various improvements made in gas-burners and lamps had established gas more firmly than ever as the most efficient and most economical form of public lighting in the leading cities of Europe. The report was adopted.

PRESENTATION TO ALD. GUMMER, OF ROTHERHAM.

A Record of Gas Chairmanship.

An interesting gathering took place on Friday evening, at the offices of the Rotherham Corporation Gas Department, when Alderman George Gummer, J.P., the Chairman of the Gas Committee, was the recipient of a beautiful silver kettle, with an accessory spirit stand. The presentation was intended by the members of the office staff and the workmen to mark the celebration of the silver wedding of Mr and Mrs. Gummer, which took place recently. The cost had been defrayed by subscription—practically every employee contributing. Mr. Henry Crank, J.P., the Vice-Chairman of the Gas Committee, presided; and in his introductory remarks he referred to the unanimity existing between the officials and the general staff as speaking well for the popularity of Alderman Gummer. Alluding to the progress of the gas undertaking, he said the year that had just terminated had been a grand one, so far as the success of the works was concerned; and considering all the circumstances, he thought that he and the Chairman, and also the Engineer and Manager (Mr. J. S. Naylor), should feel proud that there was such unanimity existing. He concluded by asking the Engineer to make the presentation.

In complying with the request, Mr. Naylor said he felt very proud indeed to fill the position in which he now found himself, and to be entrusted with so pleasing a duty. As Chairman of the Gas Committee, he believed Alderman Gummer had the true well-being of the department at heart; and while he was placed between the interests of the public and those of the employees, they believed he would hold the scales evenly and equitably. He believed he was right in saying that the gas-works had never been in a more prosperous condition than they were at the present time; and he also believed they were full of promise for the future. He had taken out a few statistics relating to the works during the thirteen years Alderman Gummer had occupied his position. The number of consumers at the beginning of 1894 was 4253, compared with 13,464 at the present time. The number of cookers in use at the first-named date was 101; while now there was 3500. The automatic meters had been introduced during Alderman Gummer's chairmanship, and they now reached the large total of 9000. The quantity of coal carbonized in 1894 was 16,700 tons, against 23,400 tons now; and the gas sold was 153 million cubic feet, compared with 256 million cubic feet at present. The gross profit made had risen from £4400 till it had reached the large sum of £18,000. The profit was originally 4 per cent.; whereas it was now 11¾ per cent. The mileage of mains had risen from 46 to 50; and the wages from £6386 to £10,290 per annum. These figures showed that great progress had been made in the gas department. In conclusion, Mr. Naylor expressed the hope that the happy relationships existing between the officials and workmen and the Chairman might long continue; that both he and Mrs. Gummer might enjoy good health and every happiness for many years to come; and that he might be long spared to continue his work in connection with the gas department, which was very much appreciated by the ratepayers of the town. Mr. T. Sleight, the oldest employee, who had been engaged at the gas-works for upwards of half-a-century, as well as Mr. J. Birtley, another old servant, added a few remarks.

In acknowledging the presentation, Alderman Gummer, who was much touched, said he was unable to express all he felt on such an occasion. He reviewed the difficulties he had met with during his chairmanship of the Gas Committee—referring especially to the labour trouble. However, this, he said, was overcome, and, fortunately, since then, with one trifling exception, they appeared to have gone on very amicably indeed; and he hoped the good relationships now existing between the Committee and the employees of the Gas Department would continue. He could not help feeling that with Mr. Naylor they seemed to be working more harmoniously than they had done in any previous stage in the history of the works. He did not wish to take any credit for anything that had been done, because the progress of the gas-works had been natural, resulting from the increase in the population, the remodelling of the works, and the new ideas that had been put into operation by the Engineers. All the Chairman and the Committee could do was to advise, and get the Council to find the money, and it was for the Engineer and the men to see that the work was carried out successfully. He took the opportunity of thanking the whole of the men, from the office staff downwards, for the excellent results which had been attained during the past year, for without their help and united action this could not have been done.

LONDON ELECTRICITY SUPPLY.

Private Enterprise to take Financial Responsibility.

The Parliamentary Committee of the London County Council are reporting to the Council to-day on the scheme that they have in mind for dealing with the question of the electricity supply of London—a question inherited by the new Council from the old. It is all a matter now what shall be done in regard to the Bill and scheme that the old Progressive party built up, and which involved astounding financial considerations. The Parliamentary Committee have considered the Bill and the scheme left by their predecessors; and they have considered the other three Bills affecting the proposed area of supply—viz., the Administrative County of London and District Electric Power Bill, which is almost entirely confined to a power to make agreements with the Council; the North Metropolitan Electric Power Supply Bill, which would enable an existing Power Company supplying in and considerably beyond the proposed area to enter into arrangements with the Council, and would also confer further power to enable the Company to supply in competition with the Council within a portion of the north-east part of the Council's proposed area of supply; and the London Electric Supply Bill, which is to authorize a combination of existing London Companies to supply electrical energy to authorized distributors within an area somewhat smaller than the Council's proposed area. None of these Bills in themselves constitute, in the opinion of the Parliamentary Committee, a satisfactory settlement of the question apart from the Council's Bill; and consequently the withdrawal of the Council's Bill would, they think, postpone the solution of the question for an indefinite period.

The Bill as drawn contemplates two alternative courses. The Council may either themselves carry out the whole of the undertaking, and raise the capital required, or they may assign or transfer their powers to some company or body, leaving the transferee to find the whole or the bulk of the necessary capital and to carry on the business. The Committee are of opinion that the alternative provisions in the Bill may be utilized for the purpose of securing some arrangement under which the financial risks to which the old Finance Committee called attention may be avoided, and in which the business of the supply of electrical energy may be carried out by private enterprise under the control of the Council. The Committee therefore suggest that the Bill should be proceeded with, with this object in view. At the present time, the Council are unable to indicate the nature and extent of the arrangement which the Council may eventually enter into; but they are strongly of opinion that any such arrangement must be in the direction of providing for a cheap supply of electric power, with a sliding-scale of prices and dividends, and a satisfactory purchase clause for the Council with regard to the undertaking.

This will necessitate certain modifications in the Bill and render desirable the deletion of the clauses relating to the compulsory acquisition of the undertakings of the Metropolitan Borough Councils. As regards the transfer to the Council of the powers of purchase over the Companies' undertakings which are vested in and inure to Metropolitan Borough Councils in most cases in 1931, the Committee think that these provisions should be distinguished from those relating to compulsory acquisition, and that therefore the Council might consider whether it is not advisable for the Council to possess these powers. The Committee are now directing attention to the character and extent of the necessary modifications, which they propose to submit to the Council as soon as possible. In the meantime, as the Bill is put down for second reading in the House of Commons on the 9th inst., it is recommended that the Bill be submitted for second reading "with a view to securing an arrangement under which private enterprise undertakes, subject to the control of the Council, the business of the supply of electrical energy, and on the understanding that such alterations as may be required in the Bill to effect this object and to deal with any other matters of importance which may arise on the Bill, will be reported to the Council for its approval as soon as possible."

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Edinburgh and Leith Gas Commissioners did not, as was expected, deal with the coal contracts for the year at their meeting on Monday, but postponed the subject to a future date. The minutes of the Works Committee, dated April 8, contained the following: "The Committee opened tenders for coal and other stores; and these, having been initialed, were handed to the Engineer for his consideration and report. The Engineer was instructed as to the way in which he should frame his report on the coal tenders; and he was also instructed to timeously circulate the reports on the coal and other tenders among the different members of the Works Committee, prior to the meeting, for their consideration." Mr. Herring, I may mention, was at his place in the meeting, and expressed himself as having quite recovered from his recent ailment. The "Glasgow Herald" continues to take a lively interest in the coal contracts of the Commissioners, and to its issue of Tuesday I am indebted for the following statement: "As forecasted the other day, the Edinburgh and Leith Gas Commissioners are face to face with a serious *impasse*, so far as the gas coal contracts are concerned. In the belief, however, that time is on their side, and that in the interval prices will fall, if not to the level of last year, at least another shilling or so, the members of the Works Committee of the Commissioners, who met yesterday, agreed to delay coming to any decision to purchase common coal; and the tenders will be again advertized. In a covering letter sent to the members of the Committee along with the reports on the tenders of coal, the Engineer, Mr. W. R. Herring, stated: 'With regard to the coal supply, it is notable that only 60 per cent. of what is usually offered has been tendered on the present occasion. It is regrettable to notice the very serious increase in the price of common coal. What is proposed to be purchased during the current year averages 12s. 6¾d., as compared with last year's purchase of 9s. 2d. This increase of 3s. 4d. is equivalent to an increased cost of 4d. per 1000 cubic feet of gas sold; and I do not anticipate the enhanced returns for residual products will be sufficient to avoid the necessity of increasing the price of gas in the autumn. There is also a moderate increase in the price of general goods and stores, and particularly those of a metallic character. Perhaps the most remarkable increase is in the cost of iron gas tubes and fittings, amounting to as much as 30 per cent. on the cost of goods.' The cannel market is not so famine-stricken; and the Committee agreed to make purchases. The exhaustive reports prepared by the Engineer on the different offers, it is understood, bore out what is summarized in Mr. Herring's letter. It was argued in some quarters that the state of the iron market and other circumstances would keep prices firm for some time to come; but the decision of the Committee, it is understood, was arrived at with unanimity. The Committee were strengthened in their view by the fact that at present they have supplies of coal to keep them going for some time, and that when these were exhausted the price may have changed in their favour." We cannot forecast the future with certainty; but I think there are already indications that the coal market is on the turn, and that the high prices of to-day will not be maintainable for very long. If this view should turn out to be correct, the Commissioners will have acted wisely in delaying to bind themselves. They have purchased cannel; and it consequently does not matter so much what sort of coal they may find in the market when they again take the subject up.

In the Edinburgh Town Council on Tuesday, Mr. J. T. R. Wilson, the Convener of the Cleansing and Lighting Committee, announced the completion of the great lighting scheme which had recently been in progress. That morning, at ten o'clock, the last flat-flame burner in the streets of Edinburgh, with the exception of a few in an obscure part, was replaced by an inverted burner—completing absolutely and for ever the supersession of the old style by the new. Twelve months ago the Committee recommended that all the remaining flat-flame lamps (between 5000 and 6000) should be fitted with inverted incandescent burners during the year. Delays occurred, owing to financial opposition, and also to the inevitable difficulties of getting a public body to at once approve such an extensive scheme with an almost new and untried system. It was long past midsummer before authority was given to proceed and the necessary men were engaged. It was, therefore, no small achievement that now, within the time originally asked, the consummation had been reached. The evolution of Edinburgh, said Mr. Wilson, from the picturesque but somewhat gloomy city of a few years ago into the modern city of light, made Edinburgh far more truly deserve the title of "La Ville Lumière" than the badly lighted Paris to which M. Victor Hugo referred. In 1903, the city was lighted by 870 arc, 138 incandescent, and 10,174 flat-flame burner lamps. To-day there were 1754 arcs, 9972 incandescents, and no flat-flame burners. The actual light in the streets, too, had increased, on a most conservative estimate, 1000 per cent. (or tenfold); yet the expenditure of the department had increased by less than 10 per cent.—even that including one-third of the cost of last year's installation; so that two years hence, he firmly believed, the increase would be wiped out altogether. The claim which he made recently that Edinburgh was the best-lighted city in the world was, he thought, absolutely indisputable, as even in the farthest suburb and in the poorest district the standard of illumination was the same. He did not say that even now all the streets were perfectly lighted; and, indeed, he would appeal to the Convener of the Electricity Committee to ask him if some of the streets recently fitted with arc lights could not have a more powerful type of lamp fixed, and so obviate the very reasonable complaints of the residents. As to the future, the gas-fitters would become available for the maintenance of the burners; and he hoped the occasional lapses from satisfactory illumination which had been seen in the past would not often recur. With regard to the lamplighting staff, the men were at present seriously overworked. Each lamplighter was called upon to clean, light, and extinguish 110 lamps, to ascend 170 flats, and extinguish 133 stair-jets. This was too much for any man. What was to be done? He suggested the entire reorganization of the lighting staff. He proposed to reduce the number of lamps per man, and to relieve them of the extinguishing of stair-lights altogether, doing that work by lads. This would mean an increase of staff of about 100. Against this he hoped to put an immense saving of gas—first, by adopting the midnight system of extinguishing half of the gas-lamps during eight months in the year; and, second, by an alteration in the hours of extinguishing the stair-jets. The lads would also help during the day in other work. The net result of his proposal would be a saving of from £1750 to £2000 on the estimates.

It is reported from Arbroath that at a meeting of the Gas Committee on Thursday the subject of the new coal contracts came up. It was stated that there would be an increase in the price of coal probably amounting to 3s. or 4s. per ton, and that this would be equivalent to an increase of 5d. per 1000 cubic feet in the price of gas. As the working of the present year's estimates had not yet been ascertained, it was stated that it would be too early to make any definite statement regarding the probable increase; but that, if the balance on the current year's working should be specially favourable, it might be possible to carry on next year with an increase of only 2½d. per 1000 cubic feet. The price of gas is at present 2s. 11d., having during the past four years been reduced by 1s. 5½d. Owing, it is said, to the large use which is now made of gas for cooking purposes, consumers are more than ever interested in any alteration in the price of gas. But while the price of coal has advanced about 20 per cent., it is pointed out that the prospective increase of the price of gas will in all probability be much less.

At Thursday's meeting of the Dundee Town Council, it was decided, on the suggestion of Mr. Stevenson, to approach the Harbour Trust, with the view of ensuring co-operation in negotiations with the Joint Railway regarding the carriage of coal and coke between the harbour and the gas-works. Mr. High spoke about blocking the Bill which is being promoted by the Railway Companies, and stated his willingness to go to London at his own expense for this purpose, and added that he would be pleased to take some of his colleagues with him. The Council took no action upon this suggestion.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *May* 4.

Sulphate of Ammonia.

The demand has been fairly well maintained; but supplies have been sufficient, and prices remain as last reported—viz., £11 13s. 9d. per ton f.o.b. Hull, and £11 16s. 3d. per ton f.o.b. Liverpool and Leith. Fresh direct orders have been scarce, and purchasing has been mainly for the purpose of covering contracts made in advance; while home demand is diminishing rapidly. The large makers, who are well sold up to the end of June and partly to the end of September, are firm at £11 17s. 6d. per ton, or over, for forward delivery; but speculators are offering abroad at substantially less money, and many are securing contracts.

Nitrate of Soda.

This article is fairly steady at 11s. 1½d. per cwt. for 95 per cent, and 11s. 3d. for refined quality.

LONDON, *May* 4.

Tar Products.

There has not been very much of interest during the past week, and prices are in most cases without any alterations of importance. In pitch, the principal London manufacturers appear to be well sold, and are no longer interested in the market for prompt; while for forward, they evidently believe in better markets, and will only quote outside prices. On the east and west coast, there is no alteration. Business is reported for prompt delivery at 25s. to 25s. 6d. and 24s. to 24s. 6d. respectively. For forward delivery, makers appear to be rather more inclined to await the course of events before committing themselves further. Creosote is still very firm, and the London manufacturers maintain their attitude of refusing to sell at present, though prompt oil has been sold on several occasions at 2⅜d. In the Midlands, makers ask 2½d. per gallon, and report having obtained this figure; while in the North, makers being well sold, appear to be asking prices much in advance of the market ideas at present. Benzol 90 per cent. is still very quiet, and low figures have been accepted. Only in London is there any degree of firmness; and here the demand is only for small quantities. Benzol 50 to 90 per cent. and toluol are both quiet; and consumers report that they are very well bought. Carbolic acid is quiet for both prompt and forward. Business has been done for the former at 1s. 7½d., which is also the outside price offered by Continental consumers for delivery to the end of the year; but makers will not accept this figure at present.

The average values during the week were: Tar, 14s. 9d. to 18s. 9d.; pitch, London, 25s. 6d. to 26s.; east coast, 25s. to 25s. 6d.; west coast, 24s. to 24s. 6d. Benzol, 90 per cent., 8½d. to 10½d.; 50-90 per cent., 10d. to 11d. Toluol, 1s. 1d. to 1s. 2d. Crude naphtha, 4⅜d. to 4⅝d.; solvent naphtha, 1s. 2d. to 1s. 3½d.; heavy naphtha, 1s. 2d. to 1s. 4d. Creosote, London, 2⅜d. to 2½d.; North, 2½d. Heavy oils, 2¾d. Carbolic acid, 60 per cent., 1s. 7½d. to 1s. 7⅞d Naphthalene, £6 10s. to £10 10s.; salts, 35s. to 40s. Anthracene, "A" quality, 1½d. to 1⅞d.

Sulphate of Ammonia.

There is little business doing; but a rather harder tone appears to prevail in the market, although there is no actual alteration in prices. London makes are still reported to have been sold at £11 10s. to £11 12s. 6d.; but the principal Gas Companies are well sold, and quote from £11 15s. to £11 17s. 6d. In Hull, the best makes have been sold at £11 12s. 6d. to £11 13s. 9d.; and there is little demand at this port. Leith is still quiet. Buyers refuse to offer more than £11 15s.; but makers are firm at £11 17s. 6d. Liverpool markets are certainly firmer rather than elsewhere, and values may be taken at £11 15s. to £11 16s. 3d.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The prosperous condition of the Lancashire coal trade continues unabated. The recent increase in the price of all classes of steam fuel is being paid cheerfully. The outlook is all on the side of the colliery owners. The general engine and machinery trades are flourishing, added to which there is a steady increase in coal exports from eastern and westerly ports. It is reported from South Wales, with some show of truth, that a French syndicate is negotiating for the purchase of collieries in that portion of the country, with intended developments on an extensive scale, to be followed by the establishment of depôts in France for the sale of all kinds of French and English coal. Something like 3 million tons of coal annually from Wales is said to be aimed at. The present prices of coal at the pits, as quoted on the Manchester Coal Exchange, are as follows: Best house coal 14s. 6d. to 15s. 6d. per ton, secondary 13s. 6d. to 14s., common 10s. 6d. to 12s. 6d., burgy 9s. 8d. to 10s. 4d., best slack 8s. 10d. to 9s. 10d., medium 7s. 10d. to 8s. 10d., low qualities 7s. 4d. to 7s. 6d., and coal for shipping 12s. 6d. to 13s. 6d. f.o.b. at Garston. Furnace coke is 17s. to 24s. per ton.

Northern Coal Trade.

There is much more activity in the northern coal trade. Shipments to the Baltic ports have now commenced, so that an active trade for some time to come is anticipated. In the steam coal branch, best Northumbrian steams are steadier at from about 14s. 9d. to 15s. per ton f.o.b., second-class steams vary from about 14s. to 14s. 6d., and steam smalls are from 9s. 6d. to 10s. The collieries are working well; and the large output seems to be taken up. As to gas coal, there is a steady demand; and where long contracts are running, the buyers naturally are claiming full deliveries, as these were at prices lower than those now ruling. The current quotations for Durham gas coals vary from about 12s. 6d. to 13s. 6d. per ton f.o.b., according to quality, and with larger exports the demand is maintained. In regard to contracts negotiating, it may now be believed that the bulk of the quantities needed have been allotted. The more recent of these have been at prices that range from about 11s. 6d. to 12s. 3d. per ton f.o.b., allowing the usual rate for the freight when included; so that it will be seen that the increase upon the price that ruled in the expiring contracts has been maintained. While at present there is a full demand that takes up the gas coal output, the loss of a part of the contracts that have so long been given to Durham will be felt. In coke, the market is firmer; and gas coke, being less plentiful, readily maintains its price of from 14s. 9d. to 15s. 6d. per ton f.o.b.

Scotch Coal Trade.

The market has been quieter during the week. The export trade has greatly fallen off; while, with the advent of warmer weather, coal for household consumption is not in demand. Splint has been officially reduced 6d. per ton. Steam coal is in steady request. The prices quoted are: Ell 11s. 9d. to 13s. 6d., splint 12s. 6d. to 12s. 9d., and steam 11s. 9d. to 12s. per ton f.o.b. Glasgow. The shipments for the week amounted to 278,541 tons—an increase upon the preceding week of 28,713 tons, but a decrease upon the corresponding week of last year of 43,297 tons. For the year to date, the total shipments have been 4,282,586 tons—an increase upon the corresponding period of 1906 of 100,203 tons.

Village Water Supplies in Yorkshire.—In the last report presented to the Bridlington Rural District Council by the Medical Officer of Health (Dr. W. A. Wetwan), he dealt with the marked falling off in the quantity of water available, due to a diminution in the rainfall and in the sources which derive their supply from some distant watershed. He stated that deep wells, formerly full, had yielded nothing for years. No doubt the increase in the number and pumping power of town waterworks had also contributed to a reduced supply. He strongly urged the necessity of providing better water services for the villages of Wold Newton, North Burton, and Rudstone.

The London Gas Companies' Coal Contracts.—The "Iron and Coal Trades Review" says: "More definite information regarding the contracts of the London gas-works is now available. The Gaslight and Coke Company have arranged for something like 500,000 tons, and the South Metropolitan Company for a somewhat smaller quantity, but several large contracts are still in negotiation. The quantities range from 100,000 to 175,000 tons per colliery; and among the firms who are reported to have closed are: The Backworth Coal Company, 120,000 tons; Messrs. John Bowes and Partners, the Pelton Coal Company, the Pelaw Main Colliery, the Washington Coal Company, the Hebburn and Wallsend Coal Company, and the Harton Coal Company. The prices, which are c.i.f. in most cases, are understood to range from 14s. 10½d. to 15s. 3d. a ton, excluding special qualities."

Llandudno Water Supply.—Last Tuesday, Colonel A. C. Smith, held an inquiry at Llandudno, respecting an application made to the Local Government Board by the Town Council for power to borrow £1120 for improvements in connection with their water undertaking. One item of the total loan is to provide a number of Deacon's waste-meters, at a cost of £400. This outlay was opposed by the representatives of the Ratepayers' Association; but the Inspector was informed that the Council had practically unanimously passed the resolution deciding to provide the meters. Mr. E. P. Stephenson (the Water Engineer) stated that one of the meters was already fixed in the Conway Road, and he found that from midnight to six o'clock in the morning the water recorded as passing into the town amounted to 25,000 gallons an hour. A portion of this was required for supplying the higher levels; but he should think that quite half of it represented waste, which they would be able to locate by the meters. The remainder of the sum to be borrowed was for increasing the supply to Craigside and Craigydon. At present these districts are served through a pipe ranging from 4 inches down to 2 inches in diameter; and it is proposed to lay an additional main ranging from 5 to 3 inches.

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Profit at Last at Britonferry.

At the last meeting of the Britonferry Urban District Council, the Gas Committee reported that a profit of £260 had been made in the past financial year; this being the first time a credit balance has been reported. The Committee, in congratulating the Council on the fact, recognized the able services and unremitting attention of the Gas Manager (Mr. John Mogford) in bringing about this gratifying result. The Chairman said it was highly satisfactory to receive such a pleasing report, showing an excellent balance; and the Manager deserved every credit for the way in which he had brought the undertaking into so successful a position. He moved that the best thanks of the Council be given to Mr. Mogford. Mr. W. Phillips said he had great pleasure in seconding the proposal, as he knew the difficulties Mr. Mogford had to contend with. An enormous amount of money had been spent by his predecessors, and had left the concern in a very unsatisfactory state; and therefore it was most gratifying to find that he had brought about such good results. The motion was agreed to. Commenting on the satisfactory result above recorded, a local paper last week said: "Mr. Mogford, the Gas Manager under the Britonferry Urban Council, has well earned the congratulations of that authority for having at length turned the gas-works into a valuable asset. Those who have followed the history of the undertaking must know something of the difficulties Mr. Mogford has had to contend with during his term of management; and the condition of the plant made it a difficulty to produce the illuminating power required. With facilities granted, better results were shown, and some return for the outlay is now made. The Council are applying for a loan of £4000 to enable them to meet growing requirements; and with the past year's satisfactory working, this should be granted."

Coal in Lincolnshire.—A correspondent to the Engineering Supplement to "The Times" states that the belief that workable coal of the Barnsley seam exists in Lincolnshire has led to the formation of a Company, and an effort to raise £5000 capital for the expenses of proving the coal in the neighbourhood of Louth, 12 miles from Grimsby. It is stated that the Syndicate have provisionally secured a large acreage for working at a royalty of 2d. per ton. It is doubtful if the coal will be found at a depth of less than 1000 yards.

Sale of Shares.—Messrs. Lee and Farr offered for sale, at the Royal Hotel, Slough, last Tuesday afternoon, 40 new ordinary £10 shares in the Slough Gas Company, ranking for a standard dividend of 7 per cent., and 10 new ordinary £10 shares in the Slough Water Company, ranking for dividend up to 7 per cent. The gas shares were put up in couples, and the first six lots were sold at £11 12s. 6d. per share; while the next ten lots fetched £17 15s. each, the following three shares £17 17s. 6d. apiece, and the last two shares £18 2s. 6d. each. There was good bidding for the water shares; the whole being purchased at £15 17s. 6d., £16 5s., and £17 7s. 6d. each. The total sale realized £872 15s.; the gas shares, of the face value of £400, fetching £710, and the water shares, with a face value of £100, realizing £162 15s.

Gas Profits at Wigan.

The full report regarding the operations of the Wigan Gas-Works during the past year is not yet issued; but Alderman Holmes, on behalf of the Gas Committee, has been giving the members of the Council some preliminary information. He said the gross profits had been £26,503. Interest on loans, bank interest, amount paid into sinking fund, bad debts, &c., came to £16,989. Public lighting was £5299; and this left a surplus of £4414. The total net profits were £9713. Perhaps some of them might ask how it was that they used to get from the gas undertaking £12,000 to £15,000, and why there was now such great discrepancy—especially when they were making more gas, and should be doing more. The answer was not far to seek. They paid in rates and taxes in 1903-4, the sum of £3542. In 1904-5, through the re-assessment, the amount was £5864. The increase in the rates during the past year had made a further difference of £1814. Taking these increases together, it meant a difference of £4078. There was another matter—the taking off of the 2d. per 1000 cubic feet in 1904. If the price that was then obtained had been in vogue this year, there would have been a further increase of £3500, which made a total with the increased rates of £7578. The public lighting in 1903-4 was £3660. In 1906-7, it had grown to £5299. They would be able to see from these figures that the gas undertaking had not gone backwards. The profits were still satisfactory in every way, and reflected the highest credit on the management.

Manchester Gas Profits.—Mr. Hynes had given notice of motion for last week's meeting of the Manchester City Council that the estimated profits accruing from the Gas Department for the year 1907-8 be used towards a reduction in the price of gas to consumers. The motion was, however, ruled out of order; but Mr. Alderman Briggs, in the absence of Mr. Alderman Gibson, the Chairman of the Committee, said that in view of the advance in the price of coal for the present year, the proposals of Mr. Hynes were out of the question.

Cost of Suction Gas.—Writing to our contemporary, "Gas and Oil Power," Mr. J. H. Leather, of the Minehead Electricity Supply Company, Limited, says that for anthracite nuts his Company are paying 29s. 11d. delivered; while at Swansea the price is 22s. 5d. per ton. With a new engine and suction-gas plant, their cost last year for fuel alone, using anthracite beans at 22s. 11d. to 25s. 11d. delivered, was 0·65d.—more than three times as much as our contemporary gave for the cost of generation. At Walthamstow, says Mr. Leather, the cost for fuel alone is 0·43d.; but he cannot find another place where they generate electricity with suction-gas plant for less than 0·6d. for coal alone. The Editor replies that the Walthamstow coal costs are high because the anthracite pressure plant, which is used there, is not economical at low loads; and he states that with anything like a decent load-factor the coal costs should not be more than 0·2d. to 0·25d. He adds that private plants are generating 1 B.H.P. hour for less than 1 lb. of coal, "but, of course, electric supply companies are always at a disadvantage over a private plant because of their bad load-factor."

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Stone Urban District Council and the Gas-Works.—The minutes presented by the Water and Lighting Committee of the Stone Urban District Council at the last meeting contained a clause stating that in the opinion of the Committee it was desirable that steps should be taken to endeavour to purchase the undertaking of the Stone Gas Company; and that the Clerk had been instructed to present to them the balance-sheet of the Company for the past year, together with all information as to the ruling prices for the purchase of similar undertakings by public bodies. The minutes were confirmed.

Accidents in Gas-Works.—An extensive escape of gas took place from one of the mains on the Newport (Mon.) Gas-Works last Friday week, owing, it is stated, to heavy pressure upon it. Fortunately the gas did not become ignited; and every effort was directed to at once get rid of the accumulation. Some of the workmen were overcome; but otherwise there was no damage or injury. Next day a fire broke out at the Southport Gas-Works, owing to tar running through a crack in the side of a still. There was a great volume of smoke, but the fire itself was not very great, and the employees, under the direction of the Engineer (Mr. John Bond), extinguished it by means of sand.

Equating the Bradford Water Loans.—Some time ago (see "JOURNAL" for Jan. 22, p. 233), a Local Government Board inquiry was held at Bradford, with reference to the application of the Corporation for a Provisional Order to partially repeal, alter, or amend the Local Acts relating to the water undertaking, so as to fix a uniform period for the repayment of loans. The Finance Committee have now received the approval of the Board of the scheme for equating the loans; and much local satisfaction is the result. At present the water-works loans of the Corporation are spread over varying periods; and it was contended that it would be very advantageous indeed to have an equation. Mr. G. A. Thorpe, the Bradford City Treasurer, therefore drafted a scheme for equation of the loans over a period of about sixty years, by which a sum of £20,000 a year less will have to be put aside—thus affording considerable immediate relief to the ratepayers.

Large Water Leakage at Ilkley.—A good deal of anxiety has been experienced at Ilkley with respect to the deficiency of the water supply during dry weather; but the result of a recent test has indicated a way out of the difficulty. Some time ago, the Urban District Council obtained the services of a geological expert to investigate and report as to the advisability of making boreholes on the moor, and constructing conduits, &c. But before entering upon an expensive scheme, an experiment was made in connection with the water which flows direct to the town from the reservoir, which supplies five-eighths of the total population. Here a serious leakage was discovered. Of the 193,250 gallons of water drawn from the reservoir in 24 hours, it was found that 146,400 gallons were wasted through leakage, and only 46,850 gallons went to the consumers. Smaller leakages were located in various other mains; and the result is that 100,000 gallons are being saved and stored each day, which is said to be sufficient to meet the daily demands of considerably more than the present number of residents in Ilkley.

Additional Purifying Plant for the Torquay Gas Company.—The prosperity enjoyed by the Torquay Gas Company during recent years has necessitated considerable increase in their plant. New and overhead luteless purifiers are now being erected—four boxes being 35 ft. by 20 ft. for oxide, and two boxes 25 ft. by 17 ft. 6 in. for lime purification. The plant, which includes elevating machinery, has been designed by the Company's Engineer (Mr. R. Beynon), and is to be erected in an existing masonry building. The purifiers will be worked by means of 20-inch Pickering purifier valves attached to the side plates, and fixed entirely outside the boxes, with provision for manipulation from the top. The work, which is in a forward state, has been entrusted to Messrs. Willey and Co., Limited, of Exeter.

Mr. S. H. Truscott has been appointed by the Davis Gas-Stove Company, Limited, their managing representative for the South of England district.

The Gas Committee of the Salford Corporation have agreed to a request by the Central Executive of the Engineering Employers and Kindred Societies, to increase the wages of the men engaged at the gas-works in trades referred to, 1s. per week each on time rates, and 2½ per cent. on piece prices.

A young Italian servant girl employed at Highgate was found last Tuesday unconscious in bed, the room being full of gas. Subsequently the girl died. At the foot of the bed was a bracket, with the tap turned full on. The Coroner, however, thought there was not sufficient evidence to say whether it was the deceased's own act; and the Jury returned an open verdict.

The Gas Committee of the West Bromwich Corporation have issued a report stating that the sales of gas during the financial year ended the 31st of March were 328,477,000 cubic feet, or an increase of 4,661,000 cubic feet compared with the preceding year, and that the amount of the gas-rental was £40,322, or a decrease of £767, due entirely to the reduction in price made on the 1st of July last.

The coal transporter at the Cowes Gas-Works has been the subject of a warm debate by the District Council, owing to the agitation in the town about the matter. Before the introduction of the transporter, demurrage had to be paid to vessels through not being able to get alongside the jetty; and it is stated that on the unloading of only one cargo of coals by the transporter a sum of £39 has been saved.

The Highways Committee of the Greenwich Borough Council state that, in view of the satisfactory nature of the experiment tried recently, of making up a portion of the roadway on Blackheath with tarred macadam, they are of opinion that economy would be effected and a cleaner condition of the streets attained by a more general use of this material for paving in the borough. In future, therefore, when considering the repair of roads and streets, the Committee will bear in mind this matter.

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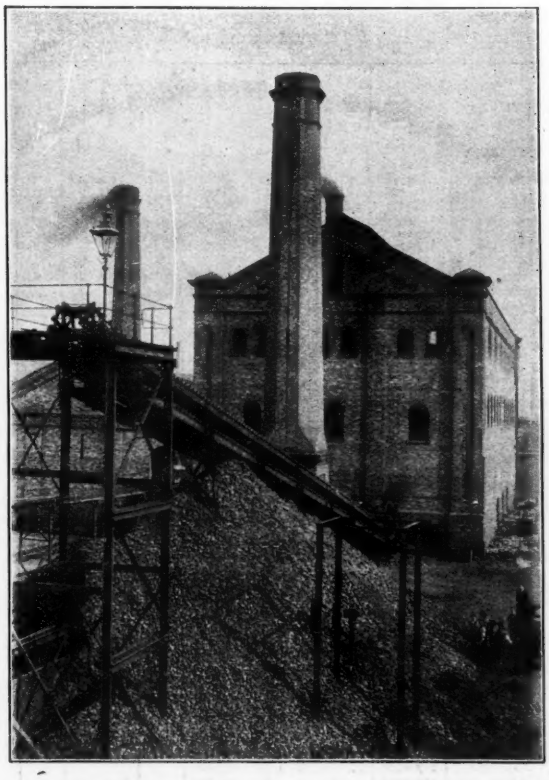

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Mr. J. R. Clynes, M.P., as Secretary of the local branch of the Gas-Workers' Union, has asked the Oldham Gas Committee for an advance of 3d. per shift for the men employed in the carbonizing department, and a week's holiday (with pay) in each year, to such as were engaged in gas producing for forty weeks in the year, with a proportion of holidays to the men who were so employed not less than twenty weeks per year. In the case of labourers and yard men of over ten years' service, he also asked for the week's holiday, with pay. He further applied for an advance of 2s. per week to meter inspectors, with similar holiday privileges as were now enjoyed by the clerks, and also for travelling expenses to their work. Another request was for extra pay for meter men who at times had to work in the workshop over the number of their full weekly hours as meter inspectors. The Committee instructed the General Manager (Mr. Arthur Andrew) to obtain a return of the wages paid to men occupying similar positions in other towns.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

LEAFLETS FOR PERIODICAL DISTRIBUTION.

"ILLUMINATING TRUTHS FOR HOUSEHOLDERS." Nos. 1 and 2 NOW READY.

No. 1.—"The Sanitary Aspects of Gas and Electric Lighting." No. 2.—"The Cleanliness of Illuminants: The Eyesight."

Prices for Quantities on Application to WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

Situations Vacant.

GAS MANAGER. Dewsbury Corporation. Applications by May 23.
GAS AND WATER MANAGER. Kendal Corporation. Applications by May 16.
COMMERCIAL MANAGER, MANUFACTURING COMPANY. No. 4765.
DRAUGHTSMAN. W. C. Holmes and Co., Huddersfield.
CHARGE OF OFFICE WORK, &c. Holyhead Gas Works.
WORKING GAS MANAGER. Wisbech.

Situations Wanted.

GAS STOVE AND METER REPRESENTATIVE. No. 4767.
INSPECTION OF GAS AND ELECTRICITY WORKS. No. 4766.
STOKER, &c. Williams, Cleobury Mortimer.
RETORT SETTERS. No. 4768.

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CLAYTON ANILINE COMPANY.

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BRASS BRACKETS. "D.," East Ham.
CARBURETTED WATER GAS PLANT, &c. Croydon Gas Company.
COMPLETE GAS-WORKS, &c. Modbury Gas Company.
EXHAUSTER. Salisbury Gas Works.
GAS-ENGINE. "G. S.," West End Advertising Agency.
PURIFIERS, &c. Stratford-on-Avon Gas Department.

Stocks and Shares.

BARNET GAS AND WATER COMPANY. May 13.
COMMERCIAL GAS COMPANY. June 4.
CROYDON GAS COMPANY. May 13.
GRAYS GAS COMPANY. May 13.
HARROGATE GAS COMPANY. May 13.
HARROGATE GAS COMPANY, (By tender.) May 28.
HARROW AND STANMORE GAS COMPANY. May 13.
HARWICH GAS COMPANY. May 13.
KING'S LYNN GAS COMPANY. May 13.
PETERBOROUGH GAS COMPANY. May 13.
WANDSWORTH AND PUTNEY GAS COMPANY. May 13.
WOKING GAS COMPANY. May 13.
WOLVERHAMPTON GAS COMPANY. May 13.

TENDERS FOR

Benzol and Benzolized Creosote.

LEIGH GAS AND WATER DEPARTMENT. Tenders by May 18.
WALSALL GAS DEPARTMENT. Tenders by May 25.

Bricks and Flags.

LEEDS GAS DEPARTMENT. Tenders by May 25.

Coal and Cannel.

BARROW-IN-FURNESS GAS DEPARTMENT. Tenders by May 15.
BEVERLEY GAS DEPARTMENT. Tenders by May 29.
BIRKENHEAD CORPORATION. Tenders by May 16.
BRECON GAS COMPANY. Tenders by May 20.
BUXTON GAS DEPARTMENT. Tenders by May 22.
CLITHEROE GAS DEPARTMENT. Tenders by May 21.
DEVONPORT GAS DEPARTMENT. Tenders by May 24.
DRONFIELD GAS COMPANY. Tenders by May 13.
EVESHAM GAS DEPARTMENT. Tenders by May 27.
GUILDFORD GAS COMPANY. Tenders by May 10.
LEIGH GAS AND WATER DEPARTMENT. Tenders by May 18.
RICHMOND WATER DEPARTMENT. Tenders by May 27.
SOUTH STAFFORDSHIRE WATER COMPANY. Tenders by May 20.
SUTTON, REIGATE and NEWHAVEN GAS COMPANIES. Tenders by May 13.

Fire-Clay Goods.

MATLOCK GAS COMPANY. Tenders by June 1.

Fittings, Brass and Meter.

DARLINGTON GAS DEPARTMENT. Tenders by May 16.

Gasholder (Re-Sheeting).

LOUGHBOROUGH GAS DEPARTMENT.

General Stores, Ironmongery, Drysaltery, Compo. Pipe, Lead, Paint, Shovels, Forks, Oils.

DARLINGTON GAS DEPARTMENT. Tenders by May 16.
LEIGH GAS AND WATER DEPARTMENT. Tenders by May 18.

Graphite (Wanted).

RUDOLF MOSSE. Hamburg.

Iron and Steel.

DARLINGTON GAS DEPARTMENT. Tenders by May 16.

Lime.

BIRKENHEAD CORPORATION. Tenders by May 16.
LEEDS GAS DEPARTMENT. Tenders by May 25.
LEIGH GAS AND WATER DEPARTMENT. Tenders by May 18.
WALSALL CORPORATION. Tenders by May 25.

Oil for Gas Making.

BARROW-IN-FURNESS GAS DEPARTMENT. Tenders by May 15.

Pipes, &c.

LEEDS GAS DEPARTMENT. Tenders by May 25.
LEIGH GAS AND WATER DEPARTMENT. Tenders by May 18.

Roofs and Materials for Retort Bench, &c.

MATLOCK GAS COMPANY. Tenders by June 1.

Sulphuric Acid.

LEIGH GAS AND WATER DEPARTMENT. Tenders by May 18.

Tar and Liquor.

BUXTON GAS DEPARTMENT. Tenders by May 22.
LEIGH GAS DEPARTMENT. Tenders by May 18.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 358.

Issue.	Share.	When Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
500,000	10	Apl 11	10½	Alliance & Dublin 10 p.c.	19—20	–1	5 5 0
268,324	10	,,	7⅞	Do. 7 p.c.	14—15	..	5 0 0
200,000	5	Nov. 14	7	Bombay, Ltd.. . . .	6¾—7¼	..	4 16 7
40,000	5	,,	7	Do. New, £4 paid	5—5⅛	..	5 1 10
50,000	10	Feb. 28	14	Bourne-) 10 p.c. r	27½—28½	..	4 18 3
51,810	10	,,	7	mouth Gas) B 7 p.c.	16⅝—17	..	4 2 4
53,200	10	,,	6	and Water) Pref. 6 p.c.	15—16	..	3 15 0
380,000	Stk.	,,	12½	Brentford Consolidated	248—253	..	4 18 10
300,000	,,	,,	9⅜	Do. New . . .	190—195	..	4 17 5
50,000	,,	,,	5	Do. 5 p.c. Pref. .	117—122	..	4 2 0
206,250	,,	Dec. 13	4	Do. 4 p.c. Deb. .	101—104	..	3 16 11
220,000	Stk.	Mch. 14	11¼	Brighton & Hove Orig.	220—225	..	5 0 0
246,320	,,	,,	8¾	Do. A. Ord. Stk. .	160—165	..	5 0 0
460,000	20	Apl. 11	10	British	42½—43¼	..	4 11 11
104,000	Stk.	Feb. 28	6	Bromley, Ord. 5 p.c. .	119—122	..	4 18 4
165,700	,,	,,	4½	Do. do. 3½ p.c. . .	90—93	..	4 16 9
500,000	10	Oct. 12	7	Buenos Ayres (New) Ltd.	11½—12	..	5 16 8
250,000	Stk.	Dec. 13	4	Do. 4 p.c. Deb. .	91—96	..	4 3 4
150,000	20	Mch. 14	8½	Cagliari, Ltd.	24—26	..	6 6 11
100,000	10	Sept. 27	10	Cape Town & Dis., Ltd.	14—15	..	6 13 4
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref.. .	8¾—9⅜*	..	4 14 9
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	50—52*	+½	5 15 5
50,000	Stk.	Dec. 28	4½	Do. 4½ p.c. Deb. Stk.	56—98	..	4 11 10
157,150	Stk.	Feb. 28	5	Chester 5 p.c. Ord. . .	109—111	..	4 10 1
1,443,280	Stk.	,,	5⅛	Commercial 4 p.c Stk. .	107—110	..	4 14 6
560,000	,,	,,	5	Do. 3½ p.c. do. .	105—108	..	4 12 7
475,000	,,	Dec. 13	3	Do. 3 p.c. Deb. Stk.	83—85	..	3 10 7
800,000	Stk.	,,	6¼	Continental Union, Ltd.	119—122	–1	5 6 7
200,000	,,	,,	7	Do. 7 p.c. Pref.	138—143	..	4 17 11
462,170	Stk.	—	5⅛	Derby Con. Stk. . . .	122—124	..	4 8 9
55,000	,,	Jan.	4	Do. Deb. Stk. . . .	103—105	..	3 16 2
486,090	10	Jan. 31	11	European, Ltd. . . .	24—25	..	4 8 0
354,060	10	,,	11	Do. £7 10s. paid	18—19	..	4 6 10
15,203,110	Stk.	Feb. 14	4⅛	Gas-) 4 p.c. Ord. . .	95—97	..	4 10 10
2,600,000	,,	,,	3½	light) 3½ p.c. max. .	87—89	..	3 18 8
3,799,735	,,	,,	4	and) 4 p.c. Con. Pref.	104—106	..	3 15 6
4,193,975	,,	Dec. 13	3	Coke) 3 p.c. Con. Deb.	83—85	..	3 10 7
258,740	Stk.	Mch. 14	5	Hastings & St. L. 3½ p.c.	95—100	..	5 0 0
82,500	,,	,,	6⅔	Do. do. 5 p.c.	116—119	..	5 9 3
70,000	10	Apl. 26	11	Hongkong & China, Ltd.	17—20*	..	5 10 0
4,940,000	Stk.	Nov. 14	8	Imperial Continental .	177—180	–1	4 8 11
473,600	Stk.	Feb. 14	3½	Do. 3½ p.c. Deb. Red.	93—95	..	3 13 8
184,602	Stk.	Mch. 14	6	Lea Bridge Ord. 5 p.c. .	117—122	..	4 18 4
306,083	,,	Dec. 28	4	L'rpool Unit'd Deb. Stk.	110—112	..	3 11 5
561,000	Stk.	Feb. 28	10	Liverpool United A . .	223—225	..	4 8 11
718,100	,,	,,	7	Do. B. .	164—165	..	4 4 10
144,140	Stk.	Feb. 14	7⅞	Maidstone 5 p.c. . .	142—147	..	5 3 8
75,000	5	Nov. 29	5	Malta & Medn., Ltd. .	4¼—4½	..	5 5 3
560,000	100	Apl. 2	5	Met. of) 5 p.c. Deb..	100—102	..	4 18 0
250,000	100	,,	4½	Melbourne) 4½ p.c. Deb.	100—102	..	4 8 3
541,920	20	Nov. 14	3¾	Monte Video, Ltd. . .	11½—12½	..	5 12 0
1,775,892	Stk.	Feb. 28	4⅝	Newc'tle & G'tesh'd Con.	106—108	..	4 5 8
406,025	Stk.	Dec. 28	3⅜	Do. 3½ p.c. Deb.	96—97	..	3 12 2
15,000	10	Feb. 28	10	North Middlesex 10 p.c.	19½—20½	..	4 17 7
55,940	10	,,	7	Do. 7 p.c.	13—14	..	5 0 0
300,000	Stk.	Apl. 26	8	Oriental, Ltd. . . .	148—153*	..	5 4 7
60,000	5	Mch. 27	7	Ottoman, Ltd. . . .	6—6½	..	5 7 8
398,490	5	Oct. 26	7	Primitiva Ord. . . .	7½—7⅝	..	4 10 4
796,980	5	Jan. 31	5	Do. 5 p.c. Pref. .	5—5¼	..	4 15 3
488,900	100	Dec. 1	4	Do. 4 p.c. Deb. .	95—97	..	4 2 6
1,000,000	10	Apl. 26	8	River Plate Ord. . . .	12¾—13¼*	..	6 0 9
312,650	Stk.	Dec. 28	4	Do. 4 p.c. Deb. .	95—97	..	4 2 6
250,000	10	Mch. 27	8	San Paulo, Ltd. . . .	12½—13	..	6 3 1
125,000	50	Jan. 2	5	Do. 5 p.c. Deb. .	48—50	..	5 0 0
135,000	Stk.	Mch. 14	10	Sheffield A	244—246	..	4 1 4
209,984	,,	,,	10	Do. B	244—246	..	4 1 4
523,500	,,	,,	10	Do. C	244—246	..	4 1 4
70,000	10	Oct. 26	10	South African	15⅝—16½	..	6 1 3
6,350,000	Stk.	Feb. 14	5¼	South Met., 4 p.c. Ord.	123—125	+1	4 8 0
1,895,445	,,	Jan. 16	3	Do. 3 p.c. Deb.	84—86	..	3 9 9
201,720	Stk	Mch. 14	8	South Shields Con. Stk.	158—160	..	5 0 0
605,000	Stk.	Feb. 28	5½	S'th Suburb'n Ord. 5 p.c.	120—123	..	4 9 5
60,000	,,	,,	5	Do. 5 p.c. Pref. .	120—123	..	4 1 4
117,058	,,	Jan. 16	5	Do. 5 p.c. Deb. Stk.	125—130	..	3 16 11
502,310	Stk.	Nov. 14	5	Southampton Ord. . .	107—112	..	4 9 3
120,000	Stk.	Feb. 28	6⅔	Tottenham) A 5 p.c. .	123—126	..	5 3 2
398,940	,,	,,	5	and) B 3½ p.c. .	101—103	..	4 17 1
137,500	,,	Dec. 28	4	Edmonton) 4 p.c. Deb.	101—103	..	3 17 8
182,380	10	,,	8	Tuscan, Ltd.	10¾—11	..	7 5 6
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	102—104	..	4 16 2
193,742	Stk.	Feb. 28	5	Tynemouth 5 p.c. max.	105—107	..	4 13 6
30,000	Stk.	Feb. 14	8	Wands-) A 5 p.c. . .	—	..	—
255,636	,,	,,	6½	worth) B 3½ p.c. . .	135—140	..	4 12 10
75,000	,,	,,	5⅝	and) C 3½ p.c. . .	111—113	..	4 19 1
79,416	,,	Dec. 28	3	Putney) 3 p.c. Deb. Stk.	79—82	..	3 13 2
845,872	,,	Feb. 28	5⅛	West Ham 5 p.c. Ord. .	101—104	..	4 18 6
185,000	,,	,,	5	Do. 5 p.c. Pref. . .	120—123	..	4 1 4
228,300	,,	Dec. 28	4	Do. 4 p.c. Deb. Stk.	102—105	..	3 16 2

Prices marked * are "Ex div."